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VOLUME 71 U. S. No. [illegible] NUMBER 4

UNITED STATES DEPARTMENT OF COMMERCE
Jesse H. Jones, *Secretary*
WEATHER BUREAU - - F. W. Reichelderfer, *Chief*

MONTHLY WEATHER REVIEW

APRIL 1943

CONTENTS

	Page
Spectral Distribution of Illumination From a Clear Sky on a Horizontal Surface. (1 fig.) C. A. Tibbey	47
North Atlantic Hurricanes and Tropical Disturbances of 1942. (1 fig.) Howard C. Sprague	49
Meteorological and Climatological Data:	
Aerological Observations	55
River Stages and Floods	55
Meteorological and Climatological Data—Continued.	
Climatological Data	57
Solar Radiation and Sunspot Data:	
Solar Radiation Observations	62
Positions, Areas, and Census of Sunspots	64
Charts I–VI	

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JUL 22 '43

MONTHLY WEATHER REVIEW

Editor, EDGAR W. WOOLARD

VOL. 71, No. 4
W. B. No. 1389

APRIL 1943

CLOSED JUNE 5, 1943
ISSUED JULY 5, 1943

SPECTRAL DISTRIBUTION OF ILLUMINATION FROM A CLEAR SKY ON A HORIZONTAL SURFACE

By G. A. TIKHOV

[Translated by Alexander Breese from *Aerosiemka*, published by the Research Institute for Aerial Photography, Leningrad, 1934]

The observations here described were carried out during the summer of 1932 at Polkovo, U. S. S. R., with a quartz spectrograph. Spectrograms were taken of the light coming from horizontally placed milk-white matte glass, illuminated alternately by total illumination from the sun and clear sky ($E+e$) and by the clear sky alone (e). To make the latter measurements the glass was shaded from the sun's rays by a cardboard screen.

The collimator of the spectrograph was set at an inclination of 45°, with its axis directed along the azimuth 90° from the sun's position. In order to obtain characteristic curves a photometric screen with 12 apertures of different sizes was placed along the optical axis of the collimator 104 mm. distant from the apertures and at a right angle to the axis. By sliding the screen and placing the apertures of different sizes on the axis of the collimator, the opening of its objective to a previously determined ratio was effected.

Data regarding conditions under which the spectrograms were made are given in table 1. Illumination from the sun alone is designated as E, and from the sky alone as e. As may be seen from the table, the observations of E and e were not obtained simultaneously, which results in a slight error. However, as the differences in the zenith distance of the sun, Z, during each pair of observations of E and e are very small, the resulting error has practically no significance.

The spectrograms were worked up by V. T. Drury with the aid of a Hartman's microphotometer. All basic computations were also made by her. From the data obtained I computed the ratio of $\frac{e}{E+e}$ which characterizes the part played by the sun in total illumination from sun and sky. The values obtained for $\frac{e}{E+e}$ are given in tables 2 and 3.

From the data given in table 3 graphs were prepared for all 19 wavelengths observed, by plotting Z as abscissa and $\frac{e}{E+e}$ as ordinate. As the values of sec Z in the first five columns of table 3 are very close, only their mean is taken and used in graphs. Smoothed curves connect the points thus obtained. In drawing these curves the highest possible magnitude of $\frac{e}{E+e}$, which cannot exceed unity, was used as a guide. A few cases on July 8, where $\frac{e}{E+e}$ appears to be more than one, are to be accounted for by errors, either in the negative plate or in taking measurements. Four typical curves of the type described above are given in figure 1.

It will be noted on this figure that several points are considerably off the curve. This may be a result of errors of observation or due to the changes in the state of the sky. The latter occurred probably at sec Z=2.020 because for all 19 wavelengths the observed $\frac{e}{E+e}$ is considerably higher than it should be according to the curves.

TABLE 1

Observation time given at mean Pulkovo time					All exposures are 20 seconds		
Time	Observations July 6, 1932			Time	Negatives good		
	Observation	Z	Z Mean		Observation	Z	Z Mean
h m				h m			
13 52.8	$\frac{E+e}{e}$	41°40′	41°45′	17 28.8	$\frac{E+e}{e}$	66°05′	66°14′
54.7		41°50′		31.2		66°23′	
14 15.7	$\frac{E+e}{e}$	43°37′	43°42′	18 1.5	$\frac{E+e}{e}$	70°10′	70°16′
17.5		43°47′		3.2		70°23′	
14 36.7	$\frac{E+e}{e}$	45°38′	45°42′	18 28.5	$\frac{E+e}{e}$	73°28′	73°34′
37.8		45°45′		30.0		73°39′	
16 34.7	$\frac{E+e}{e}$	59°18′	59°24′	18 57.0	$\frac{E+e}{e}$	76°50′	76°57′
36.5		59°30′		59.0		77°04′	
17 2.0	$\frac{E+e}{e}$	62°44′	62°52′	19 50.8	$\frac{E+e}{e}$	82°49′	82°54′
4.3		63°00′		52.5		82°59′	
Time	Observations July 8, 1932			Time	Negatives perfect		
	Observation	Z	Z Mean		Observation	Z	Z Mean
h m				h m			
11 9.1	$\frac{E+e}{e}$	38°30′	38°26′	16 15.1	$\frac{E+e}{e}$	57°14′	57°25′
11.9		38°22′		18.1		57°36′	
11 39.1	$\frac{E+e}{e}$	37°33′	37°32′	16 39.1	$\frac{E+e}{e}$	60°18′	60°20′
41.3		37°30′		41.1		60°28′	
11 52.1	$\frac{E+e}{e}$	37°19′	37°18′	17 5.1	$\frac{E+e}{e}$	63°30′	63°41′
12 0.1		37°18′		8.1		63°52′	
12 29.1	$\frac{E+e}{e}$	37°30′	37°38′	17 30.1	$\frac{E+e}{e}$	66°38′	66°49′
31.8		37°40′		33.1		67° 0′	
12 59.1	$\frac{E+e}{e}$	38°38′	38°42′	17 57.1	$\frac{E+e}{e}$	70°00′	70°08′
13 1.8		38°45′		59.1		70°15′	
13 29.1	$\frac{E+e}{e}$	40°18′	44°22′	18 19.1	$\frac{E+e}{e}$	72°41′	72°56′
31.1		40°26′		23.1		73°10′	
13 59.3	$\frac{E+e}{e}$	42°33′	42°40′	18 40.1	$\frac{E+e}{e}$	75°13′	75°22′
14 2.1		42°48′		42.4		75°30′	
14 29.1	$\frac{E+e}{e}$	45°16′	45°25′	18 59.1	$\frac{E+e}{e}$	77°27′	77°34′
32.1		45°34′		19 1.1		77°40′	
14 59.1	$\frac{E+e}{e}$	48°21′	48°28′	19 20.1	$\frac{E+e}{e}$	79°50′	79°56′
15 1.1		48°35′		22.1		80°03′	
15 51.1	$\frac{E+e}{e}$	54°19′	54°30′	19 40.1	$\frac{E+e}{e}$	82°01′	82°10′
54.1		54°40′		43.1		82°20′	

From the plotted curves the values of $\frac{e}{E+e}$ are taken for the round values of sec Z. These values are given in

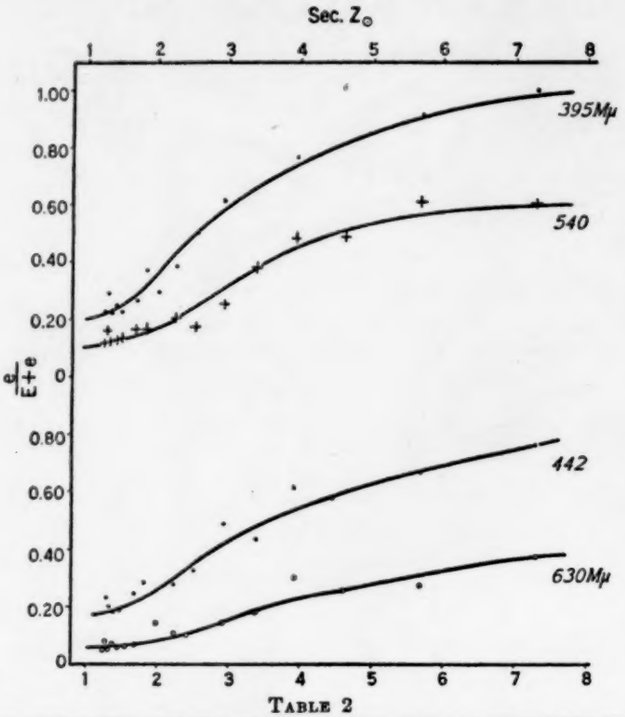


TABLE 2

Z Sec. Z	41°45′ 1.340	43°42′ 1.383	45°42′ 1.432	59°24′ 1.964	62°52′ 2.193	66°14′ 2.481	70°16′ 2.961	73°34′ 3.535	76°57′ 4.429	82°54′ 8.091
λ	$e:(E+e)$									
355	0.257	0.430	------	------	0.542	0.796	0.594	0.716	------	------
395	.257	.244	0.204	0.242	.316	.750	.397	.470	0.596	0.918
405	.313	.290	.230	.294	.365	.496	.444	.502	.682	.875
411	.234	.248	.243	.335	.291	.430	.340	.397	.548	.813
418	.221	.193	.152	.254	.262	.443	.371	.369	.631	.733
425	.221	.213	.194	.259	.282	.362	.386	.361	.578	.726
442	.197	.204	.158	.228	.236	.415	.358	.384	.607	.776
463	.167	.164	.151	.285	.268	.378	.335	.369	.521	.800
489	.175	.166	.132	.203	.262	.290	.278	.317	.380	.703
499	.171	.172	.133	.226	.232	.315	.249	.322	.457	.617
520	.152	.155	.143	.228	.250	.268	.312	.338	.380	.733
540	.155	.155	.141	.162	.190	.246	.239	.262	.398	.582
560	.122	.139	.106	.199	.194	------	.219	.265	.320	.482
580	.120	.121	.105	.161	.166	.200	.200	.218	.283	.484
599	.099	.089	.092	.202	.188	.170	.220	.248	.261	.367
615	.085	.084	.086	.157	.166	.152	.163	.199	.229	.300
630	.097	.074	.081	.162	.174	.155	.158	.204	.216	.355
646	.079	.078	.078	.132	.155	.142	.155	.163	.187	.266
665	.084	.086	.082	.141	.141	.119	.148	.170	.250	.373

table 4. As may be seen from table 4, the values of $\frac{e}{E+e}$ in each column follow in general a very definite trend according to the wavelength λ. However, in certain cases deviations are more or less considerable. For the most part these inconsistencies are probably due to errors of observation, but it is possible that some of them actually exist and may be related to the fact that the spectral absorption coefficients of the atmosphere for certain wavelengths may vary, as happens for instance in the ozone absorption bands. Much more extensive observations are needed to reach definite conclusions.

As has already been indicated, table 4 is based on observations of one day only, namely, on July 8, 1932. The observations made on July 6 give noticeable differences from the curves for July 8. There is no doubt that $\frac{e}{E+e}$ depends to a great extent upon the condition of the atmosphere, even if the sky seems to be cloudless. Only continuous spectral observations made at different places will make possible the construction of a complete picture of this phenomenon.

The principal conclusions that can be drawn from the data already available may be summarized as follows:

1. The part the clear sky has in the illumination on a horizontal surface rapidly increases at every wavelength with increase of zenith distance of the sun.

2. The influence of the clear sky with the same Z rapidly increases with decrease of λ.

3. In the ultraviolet part of the spectrum, with a large Z the illumination on the horizontal surface results exclusively from the sky $\left(\frac{e}{E+e}=1\right)$, with the sun's influence dwindling to zero. This gives an explanation of the well-known fact that an object photographed under such conditions does not produce a shadow.

TABLE 3

Z Sec Z	38°26′ 1.276	37°32′ 1.261	37°18′ 1.257	37°38′ 1.263	38°42′ 1.281	37°56′ 1.268	40°22′ 1.313	42°40′ 1.360	45°25′ 1.425	48°28′ 1.508
λ	$e:(E+e)$									
355 mμ	0.344	0.390	0.320	0.316	0.367	0.347	0.496	0.348	0.406	0.306
395	.226	.200	.258	.240	.265	.238	.303	.234	.254	.237
405	.258	.290	.299	.261	.247	.271	.292	.255	.257	.300
411	.220	.246	.263	.221	.264	.243	.283	.284	.250	.269
418	.199	.199	.211	.220	.219	.210	.246	.194	.252	.206
425	.214	.233	.214	.205	.231	.219	.261	.240	.221	.239
442	.208	.176	.214	.203	.182	.197	.250	.218	.205	.204
463	.200	.160	.186	.202	.194	.188	.204	.216	.198	.208
489	.152	.138	.172	.156	.140	.152	.197	.149	.171	.173
499	.143	.160	.164	.164	.157	.158	.168	.164	.146	.203
520	.122	.126	.142	.148	.141	.141	.136	.177	.130	.174
540	.117	.138	.125	.127	.123	.126	.173	.134	.140	.142
560	.098	.106	.132	.099	.124	.112	.149	.114	.134	.140
580	.097	.109	.112	.101	.103	.104	.150	.118	.116	.116
599	.078	.082	.093	.080	.102	.087	.126	.084	.085	.096
615	.067	.065	.084	.065	.073	.071	.114	.081	.085	.083
630	.066	.071	.078	.068	.076	.072	.100	.071	.092	.083
646	.048	.048	.065	.062	.060	.057	.090	.065	.065	.077
655	.085	.088	.090	.085	.096	.089	.104	.085	.091	.102

Z Sec Z	54°30′ 1.722	57°25′ 1.857	60°20′ 2.020	63°41′ 2.256	66°49′ 2.540	70°08′ 2.942	72°56′ 3.407	75°22′ 3.958	77°34′ 4.645	79°56′ 5.721	82°10′ 7.337
λ	$e:(E+e)$										
355 mμ	0.533	0.935	0.847	0.791	0.807	0.968	1.02	0.993	0.776	1.11	1.16
395	.279	.381	.540	.394	.507	.620	0.556	.773	.703	0.916	1.02
405	.324	.446	.501	.385	.373	.564	.670	.687	.736	.730	0.746
411	.285	.377	.552	.359	.351	.484	.555	.698	.653	.725	.753
418	.271	.375	.525	.369	.347	.485	.590	.622	.573	.771	.830
425	.286	.332	.547	.292	.292	.415	.472	.578	.590	.594	.899
442	.260	.302	.474	.297	.343	.502	.451	.630	.610	.682	.776
463	.264	.264	.367	.372	.336	.414	.489	.784	.632	.792	.774
489	.183	.198	.370	.240	.243	.330	.451	.424	.518	.679	.731
499	.183	.210	.409	.269	.226	.344	.362	.542	.489	.527	.659
520	.209	.196	.322	.300	.226	.354	.574	.667	.518	.573	.748
540	.180	.180	.304	.217	.188	.269	.396	.491	.496	.612	.607
560	.145	.165	.296	.183	.189	.229	.313	.458	.397	.375	.572
580	.142	.162	.276	.164	.167	.235	.262	.396	.386	.388	.593
599	.110	.124	.225	.150	.143	.178	.232	.431	.346	.356	.465
615	.100	.115	.186	.164	.143	.159	.256	.451	.313	.601	.483
630	.093	.095	.160	.132	.132	.173	.201	.319	.277	.294	.388
646	.084	.087	.141	.118	.124	.164	.220	.371	.251	.305	.416
665	.124	.215	.225	.150	.140	.230	.240	.272	.500	.397	.371

TABLE 4

Sec. Z Z	1.2 33°34′	1.6 51°19′	2.0 60°0′	2.5 66°25′	3.0 70°32′	3.5 73°24′	4.0 75°31′	5.0 78°28′	6.0 80°24′	7.0 81°47′
λ	$e:(E+e)$									
355 mμ	0.30	0.48	0.68	0.87	0.98	1.00	1.00	1.00	1.00	1.00
395	.23	.28	.37	.50	.61	0.69	0.75	0.85	0.94	0.98
405	.23	.30	.38	.49	.58	.65	.68	.72	.74	.75
411	.25	.28	.32	.40	.49	.57	.62	.69	.73	.75
418	.20	.24	.30	.38	.47	.56	.63	.72	.78	.82
425	.22	.25	.29	.35	.42	.49	.55	.65	.72	.78
442	.19	.22	.27	.36	.45	.51	.56	.64	.70	.76
463	.19	.22	.26	.34	.42	.51	.57	.66	.72	.77
489	.15	.18	.21	.27	.34	.40	.46	.55	.63	.71
499	.15	.17	.20	.26	.31	.38	.43	.52	.58	.64
520	.13	.17	.22	.29	.38	.46	.52	.60	.65	.68
540	.12	.15	.19	.25	.32	.41	.47	.54	.58	.60
560	.13	.14	.16	.20	.25	.31	.37	.46	.52	.56
580	.11	.12	.14	.18	.24	.29	.34	.40	.45	.49
599	.08	.09	.11	.14	.18	.24	.29	.37	.42	.45
615	.08	.09	.11	.15	.21	.27	.33	.40	.45	.48
630	.08	.09	.10	.14	.18	.22	.25	.30	.34	.38
665	.08	.10	.13	.16	.20	.25	.29	.35	.38	.40

NORTH ATLANTIC HURRICANES AND TROPICAL DISTURBANCES OF 1942

By HOWARD C. SUMNER

[Weather Bureau, Washington, January 1943]

All fully developed tropical disturbances of 1942, to the end of September, ran their full courses during the last two weeks of August. The first, a storm of near hurricane intensity, moved inland on the Texas coast during the morning of August 21. Nine days later, and before damage from the first storm could be repaired, a large and destructive hurricane crossed the coast just a hundred miles southwest of the first storm. A third disturbance, apparently of hurricane intensity, passed east of Bermuda some distance at sea during the night of August 25. Because of war restrictions on radio reports there is little available material on this storm.

September was unusually free from tropical disturbances. On two occasions, the 2d and 28th, disturbed conditions prevailed in the vicinity of Bermuda, but in both cases the intensity of the storm and the course followed are not definitely known. On the 12th conditions were disturbed near Nassau in the Bahama Islands, but no organized storm developed.

Tracks of these three September storms are not included on the chart as definitive information on intensity and movement is not available.

The hiatus in destructive tropical storms continued through October with three disturbances expending most of their energy over the ocean, and without any damaging winds being reported on shore.

During early November a severe hurricane described an unusual path from the Atlantic north of Cuba into the Caribbean Sea, and struck inland over British Honduras causing some loss of life and severe property damage in the area north of Belize.

A total of 11 tropical disturbances were observed during the 1942 season, four of which developed full or near hurricane winds. Three of the September storms, covered in the text, are not included in the accompanying table as data on their movement and intensity are lacking.

Tropical disturbance of August 18–22.—The disturbed conditions with squally weather and thunderstorms which prevailed along the Louisiana coast on the 19th, were doubtless associated with the northwestward movement of a wave formation which had been detected in the northwestern Caribbean on August 17. No definite characteristics of a tropical storm were observed until about midnight of the 20th. Moving west-northwestward toward the Texas coast, and giving few advance indications because of its small diameter, the disturbance passed inland over the Bolivar Peninsula near Gilchrist as a storm of near-hurricane intensity.

Curving northward, after crossing the coast, the storm center traversed Chambers, Liberty, San Jacinto and Polk Counties with gale winds prevalent along the north Texas coast as far south as Galveston. The storm quickly lost intensity as it moved inland toward Palestine, where a wind of only 22 miles per hour was reported.

The lowest pressure reported during the passage of the storm was 993.9 millibars (29.35 inches), at Gilchrist, and the maximum recorded wind velocity, for a 5-minute period, was 66 miles per hour (extreme 72) from the southeast reported from the Port Arthur Office at 9:20 a. m. (C. W. T.) August 21.

Tides were 3 to 7 feet above mean low water along the upper coast with the highest recorded at High Island about 30 miles northeast of Galveston. High tides caused considerable inundation of lowlands but, as much of the territory was uninhabited and had been under water before, damage from this cause was confined mostly to small craft and pier installations.

Wind damage to property has been estimated at $180,000, and to crops, principally rice, in excess of $400,000, while high tides were responsible for damage amounting to about $21,000. No loss of life or serious injury was reported.

Warnings were issued for this storm on the morning of the 19th, being lowered when winds became light on the Louisiana coast. Further warnings were issued on the 21st. Only coastal reports were available on the 20th, and the storm was so small and had so little effect on its surroundings that its true character was not seen until the winds increased materially with its arrival on the coast.

Tropical Disturbance of August 25–26.—A storm, apparently of hurricane intensity and with gales over a wide area, passed a short distance east of Bermuda during the night of August 25. No previous history is available on this storm. Bermuda reported a maximum wind velocity of 64 miles per hour at 3 a. m. (E. W. T.).

Hurricane of August 21–30.—The hurricane which swept inland over the Matagorda Bay area of Texas during the early morning hours of August 30, 1942, was one of the most severe storms on record for the Texas coast. Gales and hurricane winds prevailed over a path about 250 miles wide, with storm tides along the coast from the center northeastward to southwestern Louisiana.

The wave, from which this storm formed, passed over the Windward Islands near Santa Lucia on August 21, attended by heavy squalls but with no indications of organized circulation. Moving rapidly westward through the central Caribbean Sea, the wave formation passed south of Jamaica during the night of the 24th, where its progress became slower and the first indications of development were noted. It passed north of Swan Island as a moderate storm but with definite indications of rapidly increasing intensity, and crossed the tip of Yucatan Peninsula during the night of August 27, attended by full hurricane winds. Passing into the Gulf of Mexico, and moving northwestward in an almost straight line it reached the Texas coast, approximately two days later, as a large and severe storm attended by full hurricane winds over a path nearly 150 miles in width.

Seadrift, in Calhoun County, where a fairly complete calm occurred, reported the lowest pressure along the coast, 951.6 millibars (28.10 inches), August 30, at 4:55 a. m. The highest wind at Seadrift was estimated at 115 miles per hour. Hurricane winds accompanied the storm as far inland as Atascosa County. At San Antonio, 120 miles from the coast, the storm still retained great strength and caused considerable damage.

Tides were extremely high near the path of the center and high tides extended well to the right of the center. The highest reported was 14.7 feet at Matagorda, Tex., which placed the entire town under 4 to 8 feet of water.

Precipitation during the storm was generally light, and because of the rapid movement of the storm center it was of short duration. Contrary to the general rule for tropical storms of rapid movement, more rain fell on the left than on the right of the center. The maximum reported was 9.25 inches, on the coast about 25 miles to the left of the central track.

Estimates of damage from the hurricane have been placed at $11,500,000 to property and $15,000,000 to crops. The path of destruction covered all or portions of the follow-

ing counties: Matagorda, Calhoun, Aransas, Refugio, Jackson, Victoria, Goliad, De Witt, Karnes, Wilson, Atascosa, and Bexar. High tides and waves proved to be very destructive during this storm and by far the greatest value of warnings was in the saving of human life. In a storm which inundated entire communities and in certain localities left not a single residence undamaged the loss of only eight lives is remarkable. In the Galveston storm-warning district alone, some 50,000 soldiers and civilians were evacuated to higher ground and safer localities through the warnings.

Disturbance of September 15–22.—Between the 15th and 22d, a partially-developed wave moved westward through the Caribbean from the Windward Islands, near Santa Lucia, to British Honduras. At Swan Island, on the 20th, pressure fell to 1,002.4 millibars (29.60 inches) but no wind higher than Beaufort force 6 was reported in any observation. No advisories were issued on this storm.

Tropical disturbance of October 1–3.—On October 1 a circulation developed northeast of the Bahama Islands, and moved northeastward as a storm of wide extent and considerable intensity. It passed east of Bermuda during the night of October 2–3, attended by a large gale area, but with no available reports showing winds of hurricane force.

Disturbance, October 10–12.—This storm also formed northeast of the Bahamas, but moved north-northwestward to a position off the North Carolina Capes where its northward progress was blocked. It then curved inland over the northeastern North Carolina coast and gradually dissipated on the 12th. Heavy rainfall was recorded over northeastern North Carolina and to the northward, but no damaging winds were reported.

Slight Tropical Disturbance of October 13–18.—Forming in the northern Caribbean this disturbance moved over eastern Cuba on the 13th and, after crossing the Bahamas, curved northeastward over the Atlantic passing some distance west of Bermuda on the 17th. On the 18th it was absorbed into a stronger disturbance southeast of New England. This storm increased only slightly in intensity after leaving the Bahama region and, so far as is known, did not attain hurricane intensity.

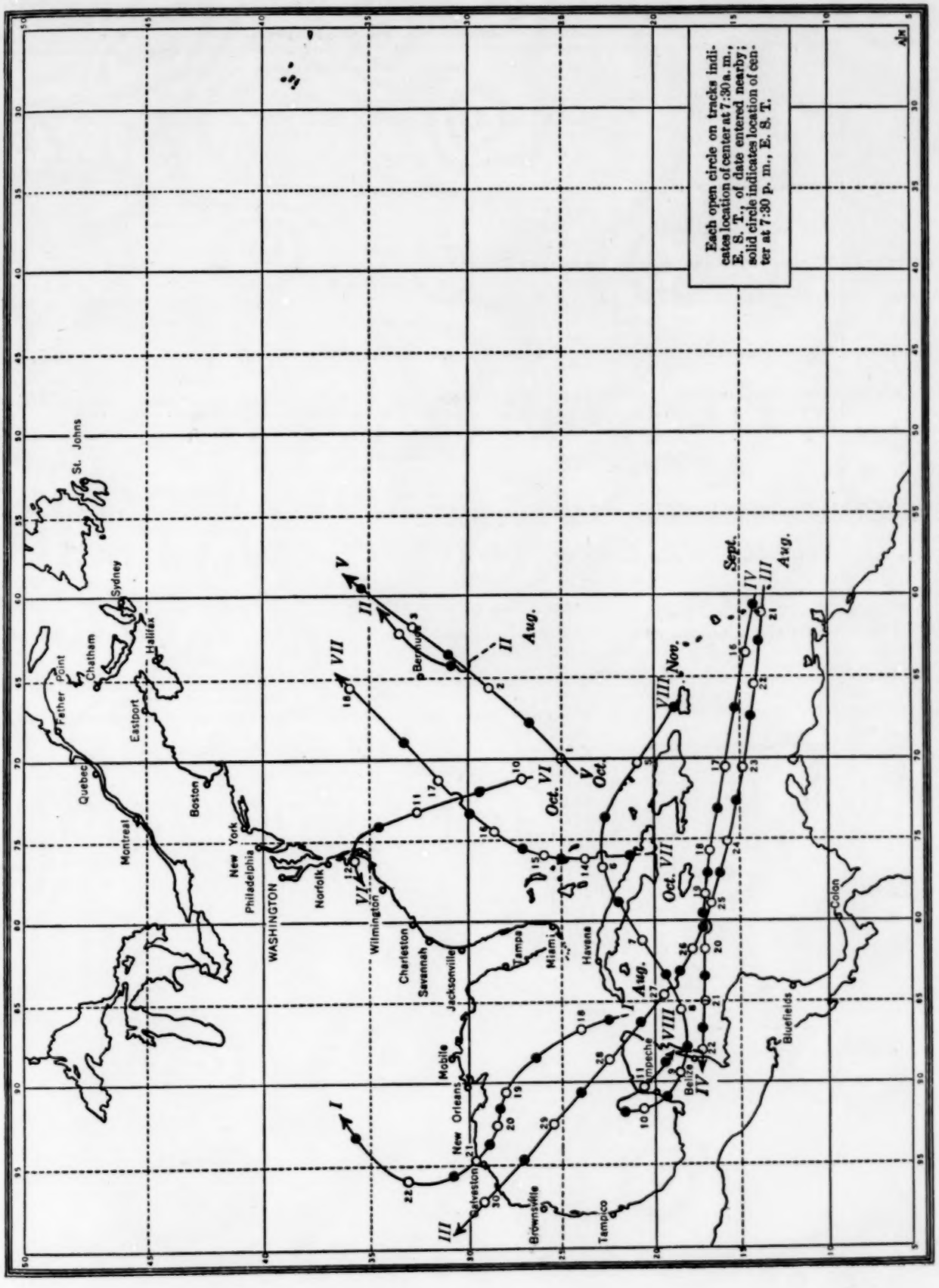
Hurricane of November 5–11.—A disturbance developed over the extreme southeast Bahamas in a katallabaric wave that had moved up from the West Indies during November 3 and 4. The lowest pressure observed during its passage over the southern Bahamas was 997 millibars (29.44 inches), accompanied by a northeast wind force 9, at Georgetown, Exuma Island. No report of damage has been received from the Bahamas. Blocked from entering the Gulf of Mexico by a ridge aloft, the disturbance turned southwestward and, increasing to hurricane or near hurricane force, crossed the north coast of Cuba a short distance southeast of Cay Paredon Grande where, in the 2 p. m. observation of the 6th, a wind of 70 miles per hour from the northeast, and pressure 994 millibars (29.35 inches), was reported. Camaguey, in the interior of south-central Cuba, recorded a low pressure of 999.7 millibars (29.52 inches) with gusts of wind up to 46 miles per hour from the south-southwest.

The disturbance weakened somewhat as it crossed the mountainous region of Cuba, but still retained an active cyclonic circulation as it passed into the Caribbean. Moving southwestward it regained hurricane intensity and, on approaching the Yucatan Peninsula, turned westward and struck inland over British Honduras between 6 and 8 p. m. of the 8th. The center emerged into the Bay of Campeche on the 9th, with lowest pressure at Campeche 998.9 millibars (29.50 inches) and a highest wind of force 9 from the east. There is no evidence that the disturbance regained hurricane intensity while in the Gulf of Mexico. On the 10th its northwest movement was blocked by high pressure at the surface and aloft and, being forced back southeastward, it reentered Yucatan and dissipated on the 11th in the interior of the peninsula.

The lowest pressure, throughout the history of the storm, was 991.5 millibars (29.28 inches) recorded at 6 and 7 p. m. of the 8th in the observatory at Belize, with winds ranging up to 54 miles per hour. North of Belize severe damage was reported from a coastal area 100 miles long and 40 to 50 miles deep. The center passed inland near or over the small village of San Pedro which was 90 percent destroyed. From Caye Corker came a report that a tidal wave had cut the island into three distinct parts carrying away everything in its path.

Damage throughout the affected area of British Honduras has been estimated at four million dollars. Of this total, one million is listed as destruction to private property, dwellings and public buildings, and the remaining three million as damage to cocoanut and other plantations and possible losses to the mahogany and chicle industries. Nine lives were lost in the northern district, but as many small fishing boats were dashed on shore or driven out to sea, the total loss of life is still unknown.

A synopsis of the hurricanes and tropical disturbances of 1942 is given in the following table. Their paths, numbered I to VIII chronologically, are shown on the accompanying chart.



Tracks of North Atlantic Hurricanes and Tropical Disturbances of 1942.

North Atlantic hurricanes and tropical disturbances of 1942

[Number of storm in table corresponds to number of path on accompanying chart]

Storm	Date	Place where first reported	Coast lines crossed	Maximum wind velocity reported	Lowest barometer reported	Place of dissipation	Intensity	Remarks
I	Aug. 18–22	Yucatan Channel	Texas	72 miles per hour SE., Port Arthur, Tex.	993.9 millibars (29.35 inches), Gilchrist, Tex.	East-Central Texas.	Near hurricane intensity.	No loss of life or serious injury reported; wind damage to property estimated $180,000 to crops $400,000; and additional $21,000 from high tides.
II	Aug. 25–26	Southeast of Bermuda.	None	64 miles per hour reported at Bermuda.	No data [1]	Northeast of Bermuda.	Likely of hurricane intensity.	Complete history lacking.
III	Aug. 21–30	Windward Islands near Santa Lucia.	Yucatan and Texas.	115 miles per hour N. (estimated), Seadrift, Tex.	951.6 millibars (28.10 inches), Seadrift, Tex.	Southern Texas	Full hurricane	8 lives lost in Texas, damage estimated $11,500,000 to property, $15,000,000 to crops.
IV	Sept. 15–22	Windward Islands near Santa Lucia.	British Honduras.	Beaufort force 6	1,002.4 millibars (29.60 inches), Swan Island.	Central British Honduras.	Not of hurricane intensity.	No gales reported.
V	Oct. 1–3	Northeast of Bahama Islands.	None	Attended by large area of gale winds.	No data [1]	Unknown	Unknown from available reports.	Attended by wide area of gale winds and dangerous squalls as it passed east of Bermuda.
VI	Oct. 10–12	Northeast of Bahama Islands.	North Carolina.	Gale winds near center.	do. [1]	Eastern North Carolina.	Probably not of hurricane intensity.	No damaging winds reported, heavy rainfall over northeastern North Carolina.
VII	Oct. 13–18	Caribbean Sea south of eastern Cuba.	Cuba	No winds over strong (25–38 miles per hour).	do. [1]	North Atlantic southeast of New England.	Not of hurricane intensity.	No reports of damaging winds.
VIII	Nov. 5–11	Near Puerto Rico	Cuba and British Honduras.	70 miles per hour NE., Paredon Grande Cay, Cuba. [2]	991.5 millibars (29.28 inches), Belize, British Honduras.	Interior of Yucatan Peninsula.	Full hurricane	9 lives lost on the Yucatan Peninsula, estimated $4,000,000 damage in British Honduras.

[1] Restriction of radio reports has resulted in a scarcity of material on storms that expended their greatest energy over water surfaces, without seriously affecting coastal areas.
[2] Higher wind velocities undoubtedly occurred in British Honduras, but records are not available.

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR APRIL 1943

[Climate and Crop Weather Division, J. B. KINCER, in charge]

AEROLOGICAL OBSERVATIONS

NOTICE.—Effective with the December 1942 issue, the publication of table 1 (RAOB summaries) was discontinued indefinitely.—EDITOR.

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during April 1943. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (538 m.)			Albuquerque, N.Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (870 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)			El Paso, Tex. (1,196 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	30	162	3.2	30	212	2.3	29	289	3.3	30	349	3.0	30	251	0.8	29	284	1.8	30	123	6.2	27	273	4.0	29	260	0.9	29	232	2.3	29	258	1.8	30	69	1.4	30	234	3.2
500							29	289	3.7										30	126	6.2	27	270	5.1	29	268	1.8	29	232	4.1	29	266	2.7						
1,000	30	175	4.7				29	268	4.4				30	280	1.9	29	287	2.0	24	154	3.5	22	264	6.3	24	299	4.7	29	251	4.6	28	262	3.9						
1,500	30	182	4.3				29	275	5.2	30	346	2.0	28	273	3.2	29	280	1.9	22	170	1.9	16	297	4.9	17	291	5.6	28	272	7.1	26	272	6.8				30	238	2.8
2,000	29	209	4.6	30	216	2.9	28	278	6.4	29	297	1.7	24	292	4.6	28	234	1.7	21	193	1.2	12	302	5.7	11	303	7.7	28	289	9.6	22	284	7.9	30	70	7.8	30	219	2.6
2,500	28	229	5.0	30	234	3.2	27	287	9.0	27	267	3.8	23	290	5.1	27	232	3.5	19	201	1.3				10	304	8.8	27	289	11.6	14	288	6.6	30	202	1.2	30	220	2.6
3,000	26	243	5.2	30	239	4.6	23	295	12.2	26	267	5.8	22	311	6.8	25	236	5.4	18	233	3.3				10	303	10.5	26	289	13.1	13	291	9.1	29	238	3.7	29	234	3.6
4,000	27	258	7.3	29	257	5.9	19	300	14.4	22	274	9.7	19	307	10.3	23	243	7.4	17	263	6.4							24	299	15.9	11	296	14.8	24	275	7.0	28	244	6.5
5,000	24	269	9.7	28	253	7.5	19	304	15.4	17	279	11.9	18	305	13.1	19	238	7.5	16	272	7.6							19	301	17.8				18	277	9.7	28	250	9.1
6,000	22	275	11.5	26	257	9.0	18	302	17.0	14	282	14.3	16	307	17.4	18	256	7.0	13	271	10.4							17	305	16.0				18	283	12.1	27	256	11.5
8,000	17	291	12.1	18	270	10.1				11	296	15.7				12	268	10.7	10	285	8.9													11	286	12.7	23	270	13.7
10,000	14	302	14.5	15	270	12.0																															17	284	11.8
12,000	10	333	16.0	10	283	12.3																															11	286	13.6

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during April 1943. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Velocities in meters per second*—Continued

Altitude (meters) m. s. l.	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las Vegas, Nev. (573 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (15 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	193	2.5	30	303	1.3	28	264	3.5	30	280	1.0	29	106	2.0	30	291	1.8	30	165	2.4	27	238	0.6	28	314	2.1	30	100	2.6	29	218	1.4	28	283	2.4	27	289	3.7
500	---	---	---	---	---	---	28	261	5.2	---	---	---	29	211	1.4	30	287	3.1	---	---	---	27	252	1.1	28	306	2.0	29	101	3.9	29	235	2.2	28	277	3.1	27	268	6.3
1,000	---	---	---	---	---	---	27	262	6.7	30	265	1.8	27	248	2.7	30	293	4.3	30	190	3.2	27	265	2.5	28	284	1.8	28	55	1.1	28	276	2.5	27	266	4.2	26	271	7.7
1,500	---	---	---	30	291	2.2	27	269	7.8	30	251	2.3	27	273	5.1	28	286	5.7	30	200	3.4	27	269	6.0	28	225	2.2	27	299	2.2	28	303	4.2	26	271	6.0	24	275	9.1
2,000	29	200	2.4	30	264	2.8	26	282	10.2	26	257	2.9	27	286	6.7	26	290	7.2	30	206	4.9	26	277	8.2	26	218	3.3	25	293	4.8	25	306	6.6	23	285	8.4	13	276	9.5
2,500	29	210	3.2	30	253	3.5	22	288	11.9	23	250	5.2	27	291	7.8	19	296	8.0	29	202	4.3	25	287	9.1	22	210	3.4	19	288	5.0	22	306	8.2	22	287	10.6	---	---	---
3,000	29	203	3.2	28	244	4.3	18	290	13.1	22	259	7.4	24	282	8.7	15	291	8.6	28	207	4.7	24	291	9.3	18	212	4.0	15	302	6.1	20	312	6.8	16	292	14.5	---	---	---
4,000	23	224	3.0	27	235	5.4	16	288	16.5	15	274	10.6	23	291	9.9	12	301	11.4	26	235	4.7	19	300	14.2	13	274	2.2	13	270	5.2	16	297	7.2	14	296	17.5	---	---	---
5,000	18	238	3.8	17	255	4.2	12	298	21.3	11	286	11.8	19	293	11.0	---	---	---	23	241	6.4	16	294	13.6	13	269	4.5	12	292	8.0	11	295	5.6	12	300	21.1	---	---	---
6,000	13	245	8.7	12	269	4.1	11	295	22.7	---	---	---	18	287	11.4	---	---	---	22	241	7.2	13	308	16.5	10	304	4.2	11	291	10.4	---	---	---	---	---	---	---	---	---
8,000	10	259	10.3	---	---	---	---	---	---	---	---	---	14	283	13.1	---	---	---	15	243	9.4	10	298	16.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10,000	---	---	---	---	---	---	---	---	---	---	---	---	12	289	16.2	---	---	---	12	243	14.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12,000	---	---	---	---	---	---	---	---	---	---	---	---	11	295	18.2	---	---	---	10	253	13.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14,000	---	---	---	---	---	---	---	---	---	---	---	---	10	290	23.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Altitude (meters) m. s. l.	Oakland Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phenix, Ariz. (388 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			St. Paul, Minn. (225 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (15 m.)			Sault Ste. Marie, (230 m.) Mich.			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	257	5.8	30	192	2.3	17	26	1.5	30	279	0.8	28	11	1.9	29	310	0.8	29	341	1.1	30	137	3.0	29	253	3.2	27	304	5.4	29	248	3.4	29	220	2.4	29	255	2.8
500	29	295	3.5	30	186	2.7	17	59	2.2	30	262	1.6	---	---	---	29	295	2.1	29	341	2.2	30	143	3.2	28	286	3.1	27	303	5.6	29	230	3.8	---	---	---	29	266	4.5
1,000	28	295	3.1	30	188	3.0	16	29	1.4	30	232	2.1	28	10	1.8	28	277	3.3	28	310	2.3	30	139	2.8	24	286	2.5	26	317	4.9	27	219	4.2	29	228	4.0	29	274	7.6
1,500	28	275	2.3	30	216	4.0	15	283	2.2	30	206	3.1	28	304	1.4	28	270	4.2	27	308	3.4	30	155	2.5	21	261	2.1	24	316	3.3	26	212	5.9	26	217	3.4	27	268	9.4
2,000	27	274	2.9	28	232	6.1	12	290	6.0	29	199	3.3	28	278	2.5	24	278	7.9	22	281	4.6	28	207	2.7	19	222	2.0	20	311	4.4	26	207	5.1	23	222	3.7	23	283	12.2
2,500	27	254	3.6	27	261	8.4	12	292	10.5	28	203	3.7	26	293	5.1	21	286	8.9	20	289	6.9	24	221	3.5	19	224	2.7	18	312	5.5	23	219	5.1	22	233	4.4	19	296	13.4
3,000	27	261	4.5	26	268	9.9	11	285	13.7	26	216	4.8	23	293	8.1	17	298	13.4	16	309	9.0	23	226	3.5	17	241	3.9	18	308	8.4	20	232	4.5	15	239	2.6	16	300	15.6
4,000	26	266	6.1	22	286	10.0	---	---	---	24	219	7.0	20	290	10.8	14	299	17.0	13	318	15.2	21	209	5.1	15	238	5.9	14	331	10.5	13	268	3.6	13	264	4.8	13	302	18.7
5,000	23	277	6.6	19	286	12.7	---	---	---	22	225	8.9	18	298	14.3	10	295	22.8	13	315	18.4	20	287	6.5	12	247	6.5	11	335	15.7	10	306	4.6	11	265	8.1	12	294	21.2
6,000	20	257	6.5	18	287	15.2	---	---	---	20	232	10.5	15	300	16.6	---	---	---	13	314	23.0	16	298	6.6	10	250	8.2	10	326	19.5	---	---	---	---	---	---	---	---	---
8,000	15	262	6.7	14	298	13.9	---	---	---	17	235	12.0	---	---	---	---	---	---	11	316	26.9	13	287	10.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10,000	---	---	---	---	---	---	---	---	---	10	245	10.0	---	---	---	---	---	---	---	---	---	11	306	11.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 3.—*Maximum free-air wind velocities (M. P. S.), for different sections of the United States, based on pilot-balloon observations during April 1943*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northwest [1]	60.0	w.	2,290	28	Phillipsburg, Pa.	50.6	nnw.	4,620	6	Buffalo, N. Y.	73.0	nw.	9,030	29	Portland, Maine.
East Central [2]	39.1	wsw.	1,110	12	Raleigh, S. C.	60.4	nw.	4,710	2	Knoxville, Tenn.			10,450	29	
Southeast [3]	39.0	nnw.	1,050	2	Spartanburg, S. C.	48.5	w.	4,960	12	Charleston, S. C.	59.5	wnw.	7,010	5	Huntington, W. Va.
North Central [4]	40.1	sw.	1,570	24	Marquette, Mich.	56.0	nnw.	3,910	5	Marquette, Mich.	56.6	ssw.	6,850	20	Jacksonville, Fla.
Central [5]	37.4	sw.	1,230	4	Wichita, Kans.	41.8	nw.	4,410	5	Joliet, Ill.	68.8	nw.	7,600	30	St. Paul, Minn.
South Central [6]	52.4	nw.	1,380	13	Tulsa, Okla.	46.4	nw.	4,320	14	Little Rock, Ark.	60.8	n.	10,000	19	Wichita, Kans.
Northwest [7]	37.5	w.	1,940	3	Havre, Mont.	38.0	wnw.	5,000	22	Billings, Mont.	62.6	wnw.	8,480	11	Amarillo, Tex.
West Central [8]	39.8	nw.	1,620	12	Sheridan, Wyo.	51.0	nw.	4,350	12	Sheridan, Wyo.	76.2	wsw.	7,910	24	Great Falls, Mont.
Southwest [9]	32.5	ssw.	1,180	8	Las Vegas, Nev.	39.5	wnw.	4,340	8	Santa Maria, Calif.	67.0	nne.	7,150	13	Redding, Calif.
											85.0	wsw.	9,110	12	El Paso, Tex.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

RIVER STAGES AND FLOODS

By C. R. JORDAN

Precipitation during April averaged 80 percent of normal for the entire country. In most States April had considerably less rainfall than March and in all but 12 States, precipitation during April was below normal for the month. The State normals ranged from 46 percent for Texas to 142 percent for Montana. Precipitation over the entire country for the first four months of the year averaged only 87 percent of normal.

Temperatures during April averaged generally below normal for most sections east of the Mississippi River and above normal over the remainder of the country. The mean temperatures for the month were from 3° to 7° below normal from Virginia and the Ohio River northward, while in the Southeast the temperatures were near normal. They were markedly above normal everywhere from the Plains States westward to the Great Basin, the largest departures from normal being in the western Plains and Rocky Mountain sections where the month was 6° to 8° warmer than normal. The unseasonably high temperatures over the upper Missouri Basin during the last week of March and the early part of April produced the highest discharge of record along the Missouri River from Bismarck, N. Dak., to Omaha, Nebr. However, a heavy snow cover still remained at the higher altitudes in the Northwest at the end of April.

Flooding associated with melting snow and ice jams occurred in western Minnesota, the eastern Dakotas, along the middle Missouri River, in northern and western Wyoming, western Montana, Idaho, northern Nevada, and Oregon. The flood along the Missouri River from Bismarck to Omaha was very severe, the previous highest stage of record at Nebraska City, Nebr., was exceeded by almost 2 feet. Flood records on many streams in Idaho and Oregon were also broken. Throughout the remainder of the country only widespread light flooding occurred.

Hudson Bay drainage.—A rather severe flood occurred in the Red River of the North, beginning the last few days of March and continuing into April. The river at Fargo, N. Dak., passed flood stage on March 31 and reached a crest of 34.3 feet on April 7. Considerable lowlands in the vicinity of Fargo were inundated and a number of residents were forced to move their belongings to higher grounds. No estimate of the damage that resulted has been received.

Atlantic slope drainage.—Rivers in this area were unusually low during the first half of April as a result of abnormally low temperatures retarding the melting of the above-normal snow covering. Warmer weather during the latter part of the month produced considerable runoff from snow-melt and the Connecticut River at South Newbury, Vt., and Hartford, Conn., rose slightly above flood stage at the end of April. The flow was augmented somewhat by rainfall on April 28 at the time of peak flow from snow-melt. No material damage was reported but traffic on a few secondary roads was obstructed by the flooding of low places along the river.

Rainfall, averaging about an inch, fell over the upper Susquehanna River basin from April 18 to 21, and the Chenango, Chemung, and Susquehanna Rivers rose slightly above flood stages at several points in New York. No damage was reported.

Moderate rains fell quite generally over the eastern section of the country, especially in the Southeast, on April 19 and 20. Amounts averaged as much as 3 inches over some basins in the Southeastern States, but streams were low from the light precipitation during the first half of the month and only light flooding occurred. Damage was light, being confined for the most part to the suspension of business in a few areas. The stations where flood stage was exceeded are listed in the table at the end of this report.

Upper Mississippi Basin.—Melting snow in the upper tributaries of the Mississippi River, and in the extreme upper Mississippi Valley proper, produced floods in that area during the early part of April. The following reports on the floods are submitted by the Officials in Charge at the Weather Bureau offices indicated:

MINNEAPOLIS, MINN.

The April 1943 flood in the extreme upper Mississippi Valley was caused by the rapid melting of a deep snow cover with the ground still frozen from a long, severe winter. Heavy and continuous rainfall is the most common cause of river floods, but this condition was absent as rains did not occur during the spring break-up and rise of streams. The temperature and snowfall in Minnesota during the preceding 4 months were the contributing factors. The mean temperature for the December–March period was 12.2°, or 3.8° below normal, and the total snowfall for the 4-month period was 47.3 inches, or 16.5 inches above normal. Although the snow layer limited the deep penetration of frost, nevertheless, the surface was frozen and unable to absorb the melting snow waters. Run-off was practically 100 percent. Ice gorges formed at some of the bridges and augmented the discharge when the gorges broke, and the older bridges were carried away and demolished. The change to mild weather and high temperature came suddenly during the closing days of March. The mean temperature for the first 3 weeks of March was 15°, the coldest of record for any similar period in March. In sharp contrast, the mean temperature for the closing 3 days was 53°, with many stations reporting maximum temperatures from 75° to 80°. This solar heat was sufficient to convert the snow layer into water.

The river stages on the morning of April 3 were: Minneapolis, 15.0 feet, or 1 foot below flood line; and St. Paul, 11.6 feet, or 2.4 feet below flood line. The crest of the flood reached Minneapolis at 1 a. m. Wednesday morning with a reading of 17.0 feet, or 1 foot above the flood line, and at St. Paul the peak occurred at 1 p. m. Wednesday with a reading of 14.5 feet, or 0.5 foot above the flood line.

The dates and duration of flood stages on the Mississippi River during April 1943 are shown in the table at the end of this report.

The Coast Guard, River Patrol, and Red Cross assisted in the evacuation and care of a number of families whose dwellings were in the lowlands at St. Paul.

Crop losses, confined principally to meadows and hay lands, were placed at $25,000; livestock loss at $5,000; buildings and fences at $10,000; and the damage to highways and bridges was estimated at $110,000. Total losses were $150,000. Three lives were lost in the high water of the Minnesota River near Montevideo. Estimated savings as a result of the advisory and flood warnings was placed at $25,000.

The records at St. Paul go back to the year 1867 and show that the flood stage of 14.0 feet has never been reached in any March month or during the winter season. The following tabulation gives the dates and river gage readings that exceeded the flood line of 14.0 feet:

Floods at St. Paul, Minn.

Year	Date	Gage reading	Year	Date	Gage reading
1867	Apr. 22	17.4	1888	Apr. 14	14.4
	July 23	18.6	1893	May 5–7	14.7
1869	Apr. 7	15.6	1897	Apr. 6	18.0
	Sept. 24–27	16.1	1905	July 11	14.8
1873	Apr. 21	16.4	1908	June 29	16.8
	June 1	15.7	1916	Apr. 6–9	16.6
1875	Apr. 16	18.0	1917	Apr. 8	16.0
1880	June 17–18	15.2	1943	Apr. 7	14.5
1881	Apr. 29	19.7			

Taking the extreme upper Mississippi basin as a whole, the Mississippi River and its tributaries have been at higher stages in many previous floods with the exception of the Fort Ripley Clearwater and Fridley districts where near records for high water were established. The actual high water record at Fort Ripley is not available as the river gage was lost when the bridge went out. At Minneapolis the crest of 17.0 feet was the highest since June 1916.

LA CROSSE, WIS.

Due solely to melting of an unusually heavy snow cover in the headwaters of the Black, Chippewa, and Mississippi Rivers, floods reaching bankful or slightly over developed in this district the first 2 weeks in April. Abnormal temperatures in the latter part of March caused the smaller tributaries such as the Root, Zumbro, Whitewater, lower Black, and Trempleau Rivers in the southern end of the district to clear their flood waters first. This was followed by flooding in the Black and Chippewa the first 3 days in April. Alternate periods of mild and freezing temperatures resulted in a slow recession in the Chippewa River so that a large volume of water from this stream met and augmented an unusually large flow of melting snow water from above St. Paul from the 5th to 10th of April. Near flood stages were reached in the upper section of the main channel from Hastings to Lake Pepin, slightly under from Dam No. 4 to 5, and flood stage or slightly above from Dam No. 5A to Dam No. 8. The Mississippi crested at La Crosse 4 p. m. of the 12th, with a stage of 12.32 feet, and at Winona, Minn., a crest of 13.63 feet at 7 a. m. of the 11th. The lower Black crested at Galesville, Wis., with a peak of 12.8 feet 4 p. m. of the 2d, and the Chippewa at Durand, Wis., 12.8 feet at 7 a. m. of the 3d. The nature of flooding was not severe and coming at this time of the year when spring freshets are normally expected and when little or no agricultural loss is anticipated, the damages were comparatively slight. It may be stated that no effective precipitation occurred during the melting snow period, a fortunate circumstance which prevented higher crest stages. Over the entire drainage area, the percentage of run-off from potential snow cover moisture is estimated as 21 percent. The instantaneous peak discharge at La Crosse was about 113,500 c. f. s.

Damages were relatively small and confined for the most part to summer homes and cottages in the bottom lands. In the Black River, some damage occurred to a bridge construction project in the McGilvary bottoms on the highway leading to Trempleau. Agricultural damage was insignificant, mostly siltation of pasture land in the Black River Valley. There was little loss by erosion due to the extended and slow run-off. Railroad beds were in danger in some low places on both banks of the Mississippi by undercutting of wave action by strong winds over the pools. Road beds have been riprapped and reinforced so that flood levels would have to exceed at least 1 foot above the flood to produce serious damage. About 12 families had to vacate their homes temporarily in the vicinity of La Crosse. Seepage in basements occurred in low places in La Crosse, Winona, and Wabasha. Seepage into the sewer system in Winona, Minn., during the high water introduces a serious problem of continual pumping.

Damages in the La Crosse district have been estimated at approximately $8,500.

DUBUQUE, IOWA

Floods which occurred during this period were mostly light or moderate, and actual flood stages were recorded only at Portage and Muscoda on the Wisconsin, and Dubuque on the Mississippi.

The flood was unusual in that the spring rainfall apparently made only incidental contributions to the major rise. It resulted largely from the fact that a high ground water level was established in the autumn of 1942 throughout most of the upper Mississippi Valley States, and the additional fact that a heavy snow cover persisted throughout the winter over the upper valleys. In the lower reaches of the district, substantial portions of the snow cover melted shortly after the middle of February, but over the upper drainage areas the early season mild temperatures had but little effect upon the snow, other than to reduce it to ice or at least to a more compact state. Much of the rise originated above Lansing on the Mississippi and above the Dells of the Wisconsin. It began during the last few days of March.

Losses along the Wisconsin River were mostly in damages to fences, etc., with an aggregate monetary value of loss or cost of repairs of $1,400. Some pasture lands in the Mississippi Valley were flooded which delayed the use of them to some extent. Damage or loss to tangible property amounted to $38,700.00, most of which was the cost of repairs to railroad roadbeds. Many basements were reported flooded, mainly by seepage, but losses were light.

The heaviest loss reported was in the suspension of business during the high water.

Missouri Basin.—Moderate rains on April 10–11 caused light flooding at a few points along the Solomon and Republican Rivers. About 4,000 acres of crops in Osborne and Mitchell Counties, Kans., were flooded with losses estimated at $15,000. Additional losses to bridges and highways were estimated at $1,000. Only light damage resulted in the Republican Basin.

A rather severe flood occurred in the upper Missouri River Basin, resulting almost entirely from the melting of a heavy snow cover. The principal flood contributor was the Yellowstone River, with substantial contributions from small tributaries in the Dakotas, such as the Little Missouri, Heart, Cannonball, James, and Cheyenne Rivers. Between Bismarck and St. Joseph, the flood in the Missouri developed into a flood comparable to that which occurred in 1881. At Nebraska City, Nebr., the Missouri reached a stage higher than the previous maximum stage of record in 1881. Serious flooding did not occur at and below Kansas City, Mo. The most serious damage, probably was in the vicinity of Omaha, Nebr. A complete report of this flood and the damage caused by it is in the process of preparation and will be published in a later issue of the REVIEW.

Ohio Basin.—Moderate rains were general over the Ohio Basin April 13–20. There was a gradual increase in stream flow during this period but flood stages were not exceeded generally in the upper portion of the basin. Rainfall over the Green River Valley from the 10th to the 19th averaged 6.91 inches and over the Ohio Valley in the vicinity of Evansville, Ind., 8.86 inches. The Ohio River reached stages slightly above flood stage at most stations below Tell City, Ind. No damage was reported.

Flood stages were exceeded slightly at a few widely scattered stations in the White, Arkansas, Red, and Lower Mississippi River Basins. Losses were light being confined mostly to delay in farm work and to the suspension of business.

West Gulf of Mexico Drainage.—Heavy local thundershowers over the upper Trinity River Basin on April 8 caused a sharp rise in the upper Trinity and its tributaries. Overflow was light and no loss or damage was reported.

Gulf of California Drainage.—Water from melting snow caused the Gunnison River at Delta, Colo., to rise slightly above flood stage from April 24 to 27, and again on April 29, and it continued above flood stage at the beginning of May.

Pacific Slope Drainage.—Storms from March 30 to April 1 produced high run-off from northern Williamette tributaries draining the Coast Range. This run-off, augmented by water from melting snow, caused some flooding in Oregon and at Vancouver, Wash.

FLOOD-STAGE REPORT FOR APRIL 1943

[All dates in April unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
HUDSON BAY DRAINAGE					
Red of the North:	*Feet*			*Feet*	
Wahpeton, N. Dak.	6	Mar. 31	8	10.7	2
Moorhead, Minn.	17	Mar. 31	18	34.3	7
Grand Forks, N. Dak.	25	4	20	33.3	13
ATLANTIC SLOPE DRAINAGE					
Connecticut:					
South Newbury, Vt.	18	26	30	19.9	29
Hartford, Conn.	16	28	May 2	17.9	30
Chenango:					
Sherburne, N. Y.	8	20	20	7.97	20
Greene, N. Y.	8	20	20	8.0	20
Chemung: Chemung, N. Y.	12	20	22	13.96	22
Susquehanna:					
Oneonta, N. Y.	12	21	26	12.63	26
		28	29	12.16	28
Vestal, N. Y.	14	20	22	15.07	20
Little Juanita: Spruce Creek, Pa.	7	19	19	7.3	19

FLOOD-STAGE REPORT FOR APRIL 1943—Continued

[All dates in April unless otherwise specified]

River and station	Flood stage	Above flood stages—dates From—	To—	Crest Stage	Date
ATLANTIC SLOPE DRAINAGE—Con.					
James:	*Feet*			*Feet*	
Columbia, Va.	10	Mar. 20	May 24	18.7	21
State Farm, Va.	12	21	22	[2] 12.4	22
Dan: Danville, Va.	11	20	20	11.8	20
Roanoke:					
Randolph, Va.	21	20	21	22.9	21
Weldon, N. C.	31	21	24	37.7	23
Williamston, N. C.	10	Mar. 23	5	11.0	Mar. 28–Apr. 1
		24	(1)	11.1	28–29
Neuse:					
Neuse, N. C.	14	21	23	15.4	22
Smithfield, N. C.	13	21	24	14.8	23
Haw: Moncure, N. C.	20	20	20	20.9	20
Cape Fear: Fayetteville, N. C.	35	21	21	35.3	21
Lock No. 2, Elizabethtown, N. C.	20	20	24	27.5	22
Pee Dee:					
Mars Bluff Bridge, S. C.	17	22	28	19.0	25
Poston, S. C.	18	28	28	18.0	28
Saluda: Pelzer, S. C.	6	19	22	7.0	20
Broad:					
Blairs, S. C.	14	20	21	15.4	20
Carlton Bridge, Ga.	15	20	20	16.2	20
Savannah:					
Butler Creek, Ga.	21	20	21	22.2	21
Burtons Ferry, Ga.	15	Mar. 23	1	20.4	Mar. 26
		24	(1)	17.4	25
Clyo, Ga.	11	Mar. 11	10	18.5	Mar. 29
		25	(1)	14.8	29–30
Ogeechee: Dover, Ga.	7	Mar. 11	4	9.3	Mar. 29
Ocmulgee:					
Abbeville, Ga.	11	Mar. 22	2	16.7	Mar. 27
Lumber City, Ga.	15	Mar. 28	2	17.7	Mar. 31
Oconee: Mount Vernon, Ga.	16	Mar. 25	1	19.1	Mar. 28
Altamaha:					
Charlotte, Ga.	12	Mar. 22	8	22.0	Mar. 30
Everett City, Ga.	10	Mar. 29	10	13.0	4
EAST GULF OF MEXICO DRAINAGE					
Apalachicola: Blountstown, Fla.	15	Mar. 5	10	23.5	Mar. 27
		22	(1)	17.3	25–26
Coosa: Gadsden, Ala.	20	20	23	20.9	21
Cahaba: Centerville, Ala.	23	19	20	28.0	19
Black Warrior:					
Lock No. 10, Tuscaloosa, Ala.	47	19	20	48.8	20
Lock No. 7, Eutaw, Ala.	35	20	24	39.0	22
Tombigbee: Lock No. 3, Whitfield, Ala.					23
Pearl:					
Jackson, Miss.	18	10	16	20.2	14
Monticello, Miss.	15	9	13	18.7	11
Columbia, Miss.	17	3	3	17.0	3
		10	14	18.9	12
Pearl River, La.	12	Mar. 20	25	17.3	Mar. 24
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Chippewa: Durand, Wis.	11	2	5	12.8	3
Black: Galesville, Wis.	12	2	2	12.8	2
Wisconsin: Portage, Wis.	17	3	6	18.0	5
Rock: Moline, Ill.	10	Mar. 15	12	13.4	Mar. 20–21
Illinois:					
Morris, Ill.	13	27	29	14.9	28
Peru, Ill.	17	28	30	18.2	28
Mississippi:					
Fort Ripley, Minn.	10	3	7	[2] 12.0	4
Minneapolis, Minn.	16	5	7	17.0	7
St. Paul, Minn.	14	6	9	14.5	7
Winona, Minn.	13	8	15	13.6	11–13
La Crosse, Wis.	12	10	15	12.3	12–13
Dubuque, Iowa.	18	13	17	18.2	16
Clinton, Iowa.	16	13	21	16.8	17
Muscatine, Iowa.	15	12	24	16.2	17–18
Keithsburg, Ill.	12	14	23	12.5	16–20
Keokuk, Iowa.	12	12	(1)	13.8	18
Quincy, Ill.	14	12	(1)	15.4	18–22
				15.4	29
Hannibal, Mo.	13	6	6	13.0	6
		10	(1)	15.6	19–20
				15.7	29
Louisiana, Mo.	12	6	6	12.1	6
		11	(1)	13.8	19–22
				13.9	
Missouri Basin					
Solomon: Beloit, Kans.	18	12	14	24.0	14
Republican:					
Guide Rock, Nebr.	10	12	12	10.5	12
Concordia, Kans.	8	12	12	8.2	12
Clay Center, Kans.	15	12	13	15.9	13

See footnotes at end of table.

FLOOD-STAGE REPORT FOR APRIL 1943—Continued

[All dates in April unless otherwise specified]

River and station	Flood stage	Above flood stages—dates From—	To—	Crest Stage	Date
Missouri Basin—Continued	*Feet*			*Feet*	
Grand: Brunswick, Mo.	12	Mar. 15	May 22	13.5	21
Missouri:					
Elbowoods, N. Dak.	17	Mar. 27	2	20.8	Mar. 31
Bismarck, N. Dak.	19	Mar. 31	4	23.2	1
Mobridge, S. Dak.	16	3	6	19.0	5
Pierre, S. Dak.	15	2	8	19.6	6
Geddes, S. Dak.	12	1	10	17.5	8
Yankton, S. Dak.	12	7	10	13.6	9
Blair, Nebr.	18	4	14	21.4	12
Omaha, Nebr.	19	8	15	22.45	13
Nebraska City, Nebr.	15	4	17	19.8	14
St. Joseph, Mo.	17	14	19	18.2	18
Lexington, Mo.	22	19	20	22.3	20
Ohio Basin					
Allegheny: Oleun, N. Y.	10	21	22	10.5	21
Little Kanawha: Creston, W. Va.	20	20	20	20.0	20
Kentucky:					
Jackson, Ky.	29	20	20	28.2	20
Lock No. 9, Valley View, Ky.	20	20	22	23.0	20
Cumberland:					
Celina, Tenn.	28	21	25	32.5	22
New River, Tenn.	18	19	19	18.0	19
Ohio:					
Dam No. 7, Midland, Pa.	30	20	21	31.2	20
Pont Pleasant, W. Va.	40	20	22	41.5	21
Dam No. 29, Ashland, Ky.	51	21	22	52.1	21
Tell City, Ind.	38	25	28	38.9	26
Dam No. 47, Newburgh, Ind.	38	24	30	41.4	27
Evansville, Ind.	37	25	30	38.8	28
Mt. Vernon, Ind.	35	26	30	36.8	29
Shawneetown Ill.	33	26	May 2	36.6	29
Dam No. 50, Fords Ferry, Ky.	34	25	May 2	38.5	29–30
Dam No. 52, Brookport, Ill.	37	28	May 1	37.7	30
Dam No. 53, Grand Chain, Ill.	42	27	May 2	43.8	30
Cairo, Ill.	40	25	May 4	42.8	30
White Basin					
White: St. Charles, Ark.	25	9	10	25.0	9–10
Arkansas Basin					
Petit Jean: Danville, Ark.	20	12	14	21.5	13
Red Basin					
Little Missouri: Boughton, Ark.	20	18	20	21.8	19
Ouachita:					
Arkadelphia, Ark.	17	18	19	18.5	19
Camden, Ark.	26	Mar. 28	2	28.3	Mar. 31
		20	26	31.4	23
Sulphur:					
Hagansport, Tex.	36	9	10	36.6	10
Naples, Tex.	22	Mar. 31	4	23.6	2
Lower Mississippi Basin					
St. Francis: Fisk, Mo.	20	26	26	20.0	26–27
Tallahatchie: Swan Lake, Miss.	26	Mar. 16	5	29.0	Mar. 21–22
WEST GULF OF MEXICO DRAINAGE					
Elm Fork of Trinity: Carrollton, Tex.	6	8	8	6.5	8
East Fork of Trinity: Rockwall, Tex.	10	9	12	13.4	10
Trinity:					
Dallas, Tex.	28	9	10	30.6	9
Trinidad, Tex.	28	Mar. 27	5	36.4	2
GULF OF CALIFORNIA DRAINAGE					
Colorado Basin					
Gunnison: Delta, Colo.	9	24	27	9.2	25
		29	(1)	9.4	30
PACIFIC SLOPE DRAINAGE					
Columbia Basin					
Long Tom: Monroe, Oreg.	10	Mar. 31	2	11.5	1
Santiam: Jefferson, Oreg.	13	Mar. 31	2	16.9	1
South Yamhill: Whiteson, Oreg.	38	Mar. 31	3	41.9	1
Willamette:					
Oregon City, Oreg.	12	1	4	12.6	3
Portland, Oreg.	18	23	24	18.2	24
Columbia: Vancouver, Wash.	15	1	4	16.4	3
		19	(1)	18.0	24

[1] Continued into May.
[2] Estimated.

CLIMATOLOGICAL DATA

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW January 1942, p. 15]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	64.2	+0.7	Andalusia	97	30	2 stations	25	[1]15	3.72	−0.78	Gadsden	7.46	Bishop	0.88
Arizona	61.6	+3.3	Mohawk	107	[1]3	Frazier's Well	12	11	.34	−.34	Groom Creek	1.75	33 stations	.00
Arkansas	62.9	+1.4	Benton	95	11	4 stations	25	15	3.20	−1.73	Highland	5.03	Crossett	1.06
California	57.0	+.9	Cow Creek	107	23	Ellery Lake	2	9	2.04	+.31	Crescent City (near)	7.54	2 stations	.00
Colorado	50.0	+6.1	3 stations	92	24	2 stations	−3	[1]11	.92	−.87	Fort Morgan	2.92	Bloom	.01
Florida	69.2	−.6	Cross City	97	29	do	30	16	2.11	−.79	Bushnell	6.85	Homestead	.31
Georgia	62.7	−.6	4 stations	95	[1]29	do	20	15	3.88	+.13	Cornelia	7.14	Brunswick	.97
Idaho	48.9	+3.7	3 stations	90	18	Big Creek	14	4	1.58	+.14	Deception Creek	5.79	Milner Dam	.03
Illinois	51.4	−1.0	Fairfield	89	8	Marengo	17	3	3.70	+.19	Streator	6.72	Edwardsville	1.16
Indiana	49.6	−2.2	4 stations	85	8	9 stations	18	3	3.20	−.35	La Porte	6.44	Indianapolis Airport	1.74
Iowa	49.0	+.2	Logan	88	24	2 stations	17	[1]14	2.57	−.13	Muscantine	6.34	Osage	.36
Kansas	58.3	+3.4	2 stations	95	[1]3	Bison	18	20	1.96	−.60	Hill City	5.99	Kinsley	.25
Kentucky	54.1	−2.0	Lovelaceville	87	9	St. John	20	3	3.91	−.07	Middlesboro	5.11	Murray	2.03
Louisiana	68.2	+1.1	Lake Providence	95	30	Ruston (near)	29	15	2.51	−2.15	Ville Platte (near)	5.34	Port Sulphur	.44
Maryland-Delaware	48.9	−3.4	2 stations	86	28	Oakland, Md	5	16	3.14	−.37	Oakland, Md	6.22	Chewsville, Md	2.29
Michigan	38.8	−4.0	Black Lake Forest	79	24	2 stations	−2	15	2.30	−.06	Port Huron	4.36	Grand Marais	1.06
Minnesota	42.9	−.2	Ada	83	8	Redby	2	2	1.10	−1.00	Pigeon River Bridge	3.66	Canby	.10
Mississippi	65.4	+.8	2 stations	95	30	4 stations	29	15	3.13	−1.71	Fruitland Park	8.12	Pearlington	.82
Missouri	56.0	+.7	do	91	29	Goodland	18	15	2.91	−1.02	Seligman	6.00	Kahoka	1.06
Montana	47.7	+4.4	do	88	[1]18	Lima	10	22	1.60	+.46	Mystic Lake	4.32	Bridger	.18
Nebraska	53.2	+3.8	Benkelman	91	3	Mumper	16	14	2.14	−.24	Oxford	5.16	Walthill	.63
Nevada	53.9	+5.8	Las Vegas	102	30	3 stations	18	[1]10	1.10	+.30	Alamo	3.08	Imlay	T
New England	38.7	−5.0	Durham, N. H	77	25	do	−5	[1]4	3.34	+.01	Somerset, Vt	5.12	Presque Isle, Maine	1.60
New Jersey	45.5	−4.1	Bridgeton	81	25	do	11	[1]7	2.82	−.83	2 stations	4.02	Boonton	1.35
New Mexico	56.2	+4.6	6 stations	100	[1]24	Eagle Nest	10	11	.23	−.68	Pennington (near)	1.61	22 stations	.00
New York	38.5	−5.7	Dansville	80	1	Stillwater Reservoir	−12	7	3.70	+.72	Whitney Point	6.55	Dannemora	1.42
North Carolina	56.6	−1.3	Mount Gilead	94	28	Mount Mitchell	6	[1]14	3.27	−.29	Mount Mitchell	5.80	Beaufort	1.53
North Dakota	44.9	+3.3	4 stations	83	21	5 stations	11	1	1.48	+.03	Max	3.01	Ashley	.31
Ohio	45.9	−3.9	Ironton	81	27	Millport	11	15	3.12	−.05	Lock No. 14	5.51	Catawba Island	1.89
Oklahoma	64.3	+3.9	Goodwell	98	24	Jefferson	26	20	2.33	−1.13	Tishomingo	6.25	Fairview	.43
Oregon	49.8	+2.5	Warm Springs Agency	89	14	Chemult	13	26	2.58	+.89	Valsetz	8.49	Warm Springs Reservoir	.55
Pennsylvania	43.1	−5.5	2 stations	83	[1]1	2 stations	7	[1]7	3.98	+.55	Philipsburg	7.00	Philadelphia C. O	2.05
South Carolina	61.2	−1.1	2 stations	94	28	Caesars Head	20	15	3.70	+.48	Walhalla	7.27	Miley	1.21
South Dakota	50.1	+4.1	Winner	90	3	Ralph	12	14	.94	−1.14	Custer	5.15	2 stations	.03
Tennessee	57.8	−.9	Coldwater	90	30	Erwin	18	16	3.77	−.62	Crossville	6.48	Selmer	1.86
Texas	69.3	+3.2	Fort Stockton	105	[1]24	Muleshoe	31	1	1.32	−1.71	Arthur City	5.13	3 stations	.00
Utah	53.2	+6.0	Greenriver	95	30	Boyce Canyon	11	12	.82	−.38	Bedt River Refuge	2.53	2 stations	T
Virginia	52.1	−2.4	Clarksville	93	[1]26	Big Meadows	14	[1]3	2.95	−.34	Pennington Gap	4.57	Quantico	.78
Washington	50.5	+1.9	Wahluke	90	[1]13	Paradise	16	22	2.89	+.62	Highley Peak	16.99	Wenatchee	.06
West Virginia	47.8	−3.9	Hinton	85	25	Seneca State Forest	10	4	3.84	+.31	Kumbrabow State Forest	6.35	Moorefield	2.03
Wisconsin	41.7	−2.0	2 stations	79	24	2 stations	0	3	1.67	−.83	Beloit	3.86	Mondovi	.53
Wyoming	47.9	+7.5	do	86	[1]3	Lookout (near)	9	12	1.36	−.26	Middle Fork	3.91	Powell	.11
Alaska (March)	16.9	+3.2	Radioville	61	1	Aliakaket	−52	21	1.34	−.46	Baronof	6.92	Eagle	.04
Hawaii	71.8	+1.7	2 stations	90	[1]16	Volcano Observatory	48	3	6.39	−2.06	Kukui, Maui	45.00	7 stations	.00
Puerto Rico	75.6	+.6	Utuado	95	11	Guineo Reservoir	52	7	7.80	+3.81	Carite Camp	16.52	Vieques	.78

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean maximum+mean minimum+2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	%	*In.*	*In.*		*Miles*								*0-10*	*In.*	*In.*	
New England							**38.6**	**−4.0**								**70**	**70**	**3.04**	**0.0**										**6.1**			
Eastport	75	67	85	29.78	29.88	−0.05	36.0	−3.0	60	23	43	15	7	29	29	29	77	2.92	+.1	14	11.4	sw.	42	sw.	14	9	9	12	8.9	10.2	0.0	1
Greenville, Maine	1,070	6	41	28.69	29.89	.....	31.4	−5.1	63	24	43	4	4	20	39	25	...	3.58	+.7	17	...	nw.	...	...	...	5	11	14	...	29.0	2.8	0
Portland, Maine [1]	103	5	36	29.77	29.89	−.07	38.4	.....	72	25	49	15	7	28	43	27	67	3.34	.0	16	10.9	nw.	38	w.	14	11	8	11	5.2	2.7	.0	2
Concord [2]	289	4	45	29.59	29.92	−.07	38.4	−5.0	72	25	50	14	6	27	44	26	63	2.82	.0	13	9.3	nw.	31	nw.	6	7	11	12	6.2	3.0	.0	2
Burlington [2]	403	11	48	29.46	29.92	−.07	36.3	−7.0	67	24	45	10	6	28	35	28	71	2.24	+.1	15	9.8	nw.	41	s.	12	5	3	22	7.7	6.5	.0	1
Northfield	876	12	60	28.94	.....	.....	34.8	−5.5	67	25	45	8	6	25	40	...	...	2.90	+.6	17	8.6	n.	30	s.	12	5	7	18	7.4	9.3	.0	1
Boston [1]	124	33	62	29.76	29.91	−.06	43.4	.....	75	25	52	20	7	35	27	28	59	2.64	−.7	15	13.8	nw.	37	ne.	19	5	14	11	6.3	T	.0	3
Nantucket	12	10	63	29.90	29.92	−.05	41.8	−1.6	66	26	48	23	7	35	21	34	78	2.82	−.1	16	13.0	sw.	37	ne.	19	10	10	10	5.8	T	.0	3
Block Island	26	11	46	29.90	29.94	−.04	41.4	−2.6	62	28	48	22	7	35	20	33	76	3.33	−.2	12	18.4	w.	47	nw.	6	15	7	8	4.1	T	.0	4
Providence [2]	159	46	60	29.75	29.94	−.04	44.0	−2.6	73	25	53	20	7	35	28	30	65	3.72	+.5	15	11.0	nw.	34	se.	12	8	9	13	6.2	.4	.0	4
Hartford [1]	159	5	44	29.76	29.94	−.05	42.8	.....	72	25	53	20	6	33	38	31	67	2.99	−.4	16	11.5	n.	37	sw.	12	5	13	12	6.1	.1	.0	5
New Haven [2]	107	74	153	29.83	29.96	−.03	43.4	−3.8	70	25	52	21	6	35	28	33	73	3.17	−.4	13	10.6	nw.	27	nw.	6	6	13	11	6.1	T	.0	2
Middle Atlantic States							**47.8**	**−3.6**								**63**	**63**	**2.77**	**−0.2**									**6.1**			
Albany [1]	97	26	40	29.82	29.93	−.07	39.7	−4.7	70	24	48	14	6	31	36	28	66	2.91	+.8	16	11.7	nw.	45	w.	5	5	7	18	7.0	3.0	.0	3
Binghamton	871	57	79	29.02	29.98	−.04	39.2	−6.2	69	24	48	14	6	30	38	29	72	3.85	+1.4	15	7.4	w.	24	w.	30	2	7	21	7.9	7.8	.0	2
New York	314	415	454	29.60	29.96	−.04	45.4	−4.0	74	25	54	23	6	37	27	31	60	2.25	−1.0	13	19.2	nw.	55	nw.	6	7	16	7	5.5	T	.0	4
Harrisburg	374	30	49	29.57	29.98	−.04	46.0	−4.9	79	25	56	25	16	36	34	32	62	3.28	+.6	13	10.5	nw.	35	nw.	5	3	14	13	6.5	.6	.0	1
Philadelphia [2]	114	174	367	29.85	29.99	−.02	46.8	−5.3	77	25	57	25	7	36	34	34	64	2.61	−.4	13	11.9	nw.	37	nw.	12	4	13	13	6.1	T	.0	2
Reading	323	47	306	29.64	.....	.....	46.4	−4.3	78	25	56	25	7	37	30	...	...	2.90	−.4	13	14.8	nw.	45	w.	5	7	6	17	6.8	1.2	.0	2
Scranton	805	72	104	29.09	.....	.....	41.4	−6.7	71	25	51	18	6	32	35	...	...	2.15	−.6	15	7.9	nw.	29	nw.	5	3	14	13	6.8	3.9	.0	2
Atlantic City	52	37	172	29.91	29.98	−.02	46.4	−1.4	80	28	54	25	7	38	35	35	70	4.00	+1.0	12	17.8	s.	52	ne.	19	7	13	10	5.6	.0	.0	5
Trenton	190	89	107	29.76	29.97	.....	46.0	−3.8	77	25	56	25	7	36	32	31	61	2.10	−.8	12	11.5	nw.	34	nw.	6	6	15	9	5.9	T	.0	1
Baltimore [2]	123	100	215	29.85	29.99	−.02	50.6	−3.0	82	25	60	31	4	41	32	34	60	2.56	−.8	10	12.6	nw.	41	s.	13	8	11	11	5.8	T	.0	2
Washington [2]	112	56	100	29.86	29.99	−.03	51.2	−2.1	81	25	62	31	3	41	33	34	56	3.30	.0	10	10.0	nw.	34	nw.	13	8	11	11	5.8	T	.0	3
Cape Henry	18	8	54	30.07	30.10	.....	53.8	−.8	90	28	62	32	16	45	32	42	68	2.15	−1.2	8	13.7	sw.	55	nw.	13	9	15	6	5.1	.0	.0	3
Lynchburg	686	144	184	29.27	30.00	−.02	54.4	−2.9	85	28	66	27	16	43	38	34	52	2.61	−.3	7	10.1	nw.	34	w.	13	9	12	9	5.4	T	.0	1
Norfolk [2]	91	80	125	29.91	30.02	+.01	55.1	−1.7	88	28	65	33	16	45	34	41	68	2.77	−.5	10	11.9	sw.	43	nw.	13	9	13	8	5.3	.0	.0	4
Richmond [2]	144	11	52	29.83	29.99	−.03	54.2	−2.4	89	28	66	29	16	42	36	37	58	2.16	−1.3	4	10.5	sw.	46	nw.	13	8	12	10	5.6	T	.0	2
South Atlantic States							**61.0**	**−0.7**								**64**	**64**	**2.61**	**−0.5**									**4.7**			
Asheville	2,253	89	104	27.68	30.04	+.01	53.2	−.7	82	30	65	25	4	42	40	36	61	2.89	−.1	11	9.6	nw.	32	nw.	30	7	12	11	6.2	.8	.0	4
Charlotte [2]	779	63	86	29.19	30.03	.00	59.6	−.2	90	28	71	30	15	48	31	41	61	2.85	−.5	7	8.7	sw.	33	sw.	13	12	9	9	5.3	.0	.0	4
Greensboro [1]	886	6	56	29.08	30.03	.....	55.5	.....	87	28	68	21	4	43	40	39	62	3.63	.....	8	10.4	sw.	40	nw.	13	9	12	9	5.7	T	.0	4
Hatteras	11	5	50	30.00	30.02	+.01	57.4	−2.4	76	27	64	35	16	51	25	49	76	2.14	−1.4	6	14.9	sw.	47	nw.	13	11	10	9	5.0	.0	.0	5
Raleigh [1]	376	27	69	29.61	30.02	−.01	58.0	−.2	90	28	70	29	16	46	38	40	59	2.67	−.8	8	11.7	sw.	45	nw.	13	10	9	11	5.7	.0	.0	5
Wilmington	72	73	107	29.96	30.04	−.01	60.4	−1.6	81	26	69	35	4	51	26	48	69	2.11	−.6	4	11.8	sw.	41	sw.	12	13	13	4	4.0	.0	.0	1
Charleston [2]	48	11	92	29.98	30.04	+.01	63.5	−1.0	85	10	71	39	15	56	26	50	71	2.69	+.2	7	12.0	sw.	33	nw.	13	20	5	5	3.4	.0	.0	3
Columbia, S. C.	347	70	91	29.64	30.02	−.01	62.6	−.7	91	28	74	33	15	52	30	49	67	3.16	−.3	8	10.0	sw.	32	sw.	13	14	9	7	4.2	.0	.0	3
Greenville, S. C.	1,040	70	78	28.90	30.01	.....	59.4	+.8	90	28	71	29	15	48	34	40	59	4.00	+.3	7	10.6	sw.	40	w.	13	9	12	9	5.3	.0	.0	4
Augusta [2]	182	62	77	29.83	30.03	.00	63.6	−.6	91	28	75	34	15	52	33	43	52	2.88	−.3	7	7.2	nw.	28	nw.	30	14	10	6	4.5	.0	.0	4
Savannah [2]	65	73	152	29.97	30.05	+.02	65.6	−.4	92	28	75	40	15	56	32	50	66	2.03	−.5	6	12.0	sw.	31	sw.	12	18	8	4	3.3	.0	.0	3
Jacksonville [2]	43	86	110	30.01	30.06	+.02	68.0	−.7	91	29	77	43	15	59	29	54	70	1.25	−1.1	7	8.7	se.	29	w.	13	15	9	6	4.1	.0	.0	6
Florida Peninsula							**72.9**	**−0.2**								**73**	**73**	**1.35**	**−0.8**									**4.5**			
Key West [2]	21	10	64	29.99	30.02	.00	75.6	−.1	85	13	80	65	6	71	12	64	72	1.03	−.3	6	11.3	e.	34	w.	19	15	6	9	4.4	.0	.0	4
Miami [2]	25	124	168	30.00	30.04	+.01	71.6	−1.2	85	13	76	56	25	67	21	62	76	2.26	−.8	6	13.1	e.	28	ne.	4	9	12	9	5.3	.0	.0	4
Tampa [1]	35	5	61	30.00	30.05	−.01	71.6	+.7	89	11	81	51	16	62	29	58	72	.75	−1.3	2	10.8	e.	38	s.	18	15	10	5	3.9	.0	.0	2
East Gulf States							**65.6**	**+0.7**								**68**	**68**	**3.36**	**−0.9**									**3.9**			
Atlanta [1]	1,173	5	72	28.80	30.03	.00	61.4	+.3	88	30	72	32	15	51	37	44	61	5.70	+2.0	8	11.2	nw.	37	s.	12	11	11	8	4.9	.0	.0	5
Macon [2]	370	79	87	29.64	30.04	+.01	63.6	−.3	90	30	75	33	15	52	35	46	61	3.84	+.7	7	7.8	nw.	25	sw.	12	16	8	6	4.2	.0	.0	5
Thomasville	273	49	58	29.79	30.12	+.09	66.6	−.1	92	29	78	40	15	55	32	...	...	2.59	.....	5	...	e.	...	...	...	12	11	7	...	.0	.0	2
Apalachicola	35	11	51	30.01	30.05	.....	66.8	−.3	84	10	74	45	15	59	21	56	75	2.62	−.2	5	8.7	se.	29	se.	18	15	10	5	3.7	.0	.0	4
Pensacola	56	54	79	29.99	30.05	+.03	66.9	+.2	87	29	75	44	15	59	23	55	74	1.36	−2.7	6	8.3	w.	29	se.	17	18	5	7	3.6	.0	.0	2
Anniston	741	9	...	...	...	...	62.0	+1.6	91	30	75	28	15	49	38	...	...	4.97	.....	6	...	nw.	...	...	...	18	8	4	...	.0	.0	6
Birmingham [2]	700	11	48	29.30	30.05	+.03	63.4	+.1	91	30	74	33	15	52	30	46	62	4.49	−.3	7	7.6	s.	30	s.	11	12	11	7	4.5	.0	.0	4
Mobile [2]	57	6	30	29.99	30.06	+.04	67.6	+1.3	90	30	77	42	15	58	27	54	72	3.09	−1.5	5	6.8	s.	19	nw.	14	17	8	5	3.4	.0	.0	3
Montgomery [2]	218	92	105	29.81	30.04	+.01	65.8	+.5	91	30	76	38	15	55	30	49	63	3.35	−1.0	8	7.5	w.	24	w.	13	14	9	7	4.0	.0	.0	4
Meridian [2]	375	67	92	29.64	30.04	+.02	65.4	+1.4	91	30	77	34	15	54	32	51	68	4.35	−.4	6	6.8	s.	22	w.	13	17	10	3	2.9	.0	.0	1
Vicksburg [2]	247	82	102	29.77	30.03	+.03	67.8	+2.2	90	30	78	40	15	58	29	52	74	3.47	−1.7	6	8.9	s.	21	nw.	13	14	11	5	3.8	.0	.0	2
New Orleans [4]	53	76	84	29.99	30.04	+.04	69.8	+1.0	90	29	78	47	15	61	24	58	71	1.28	−4.0	5	7.0	se.	21	nw.	18	17	6	7	3.9	.0	.0	3
West Gulf States							**68.8**	**+2.5**								**70**	**70**	**2.17**	**−1.5**									**5.3**			
Shreveport [1]	249	5	64	29.75	30.01	+.04	68.0	+3.2	91	30	79	38	15	57	33	55	69	2.63	−2.0	5	10.4	s.	31	nw.	13	13	9	8	3.1	.0	.0	3
Bentonville	1,303	12	51	28.65	.....	.....	59.6	+2.7	86	10	71	33	19	48	37	...	...	3.27	−1.1	11	9.1	sw.	...	...	...	17	7	6	...	.0	.0	8
Fort Smith	463	57	82	29.50	29.98	+.02	64.9	+3.1	91	10	75	38	15	54	35	46	56	4.12	+.2	5	8.9	e.	26	sw.	8	12	9	9	5.0	.0	.0	4
Little Rock [1]	357	94	102	29.64	30.02	+.04	63.2	+1.1	88	30	74	34	15	52	38	49	65	4.57	−.6	10	9.7	sw.	28	se.	3	14	6	10	5.1	.0	.0	5
Austin [1]	605	11	41	29.34	29.97	.....	70.6	+2.8	89	26	82	46	20	60	31	57	67	2.68	−1.7	2	10.6	s.	27	se.	7	10	10	10	5.4	.0	.0	3
Brownsville	57	88	96	29.88	29.93	.....	74.6	+.9	97	11	84	55	14	65	26	65	80	.04	−1.7	1	12.6	se.	34	se.	7	8	10	12	5.9	.0	.0	1
Corpus Christi [1]	20	11	78	29.95	29.97	+.02	73.0	+2.2	90	17	81	53	19	65	30	64	80	.36	−1.4	2	12.9	se.	34	se.	16	5	12	13	6.4	.0	.0	2
Dallas [1]	512	6	46	29.44	29.96	.....	69.2	.....	92	30	80	41	15	59	33	54	65	1.63	−2.6	4	13.2	s.	30	s.	21	12	7	11	4.9	.0	.0	2
Fort Worth [1]	679	35	56	29.26	29.97	+.03	69.2	+5.1	92	30	80	45	15	58	32	53	63	1.63	−2.4	5	13.4	s.	30	s.	21	13	8	9	4.7	.0	.0	4
Galveston [2]	54	106	114	29.95	30.01	+.04	70.4	+1.7	85	15	66	17	63	83	.33	−2.7	3	10.9	se.	24	se.	27	8	15	7	5.2	.0	.0	2
Houston [2]	138	157	190	29.87	30.01	.....	70.8	+1.5	87	30	80	48	15	62	26	60	77	.74	−2.8	4	11.1	se.	25	s.	16	4	19	7	5.9	.0	.0	1
Palestine	510	64	72	29.48	30.00	+.04	69.0	+3.0	88	30	79	42	15	59	30	54	65	1.99	−2.4	4	8.5	s.	20	s.	21	15	9	6	...	.0	.0	3
Port Arthur	34	59	134	29.99	30.02	.....	70.8	.....	87	12	78	49	15	64	26	61	77	4.86	+1.9	4	13.4	s.	37	n.	17	7	11	12	5.8	.0	.0	3
San Antonio [1]	693	28	59	29.25	29.96	+.03	71.8	+2.7	91	26	83	50	19	61	32	56	65	1.48	−1.7	4	10.0	se.	38	n.	17	5	12	13	5.9	.0	.0	3
Ohio Valley and Tennessee							**50.9**	**−3.1**								**66**	**66**	**3.25**	**−0.4**									**6.0**			
Chattanooga [1]	762	21	54	29.22	30.04	+.01	58.4	+.8	88	30	71	27	15	45	40	44	66	5.50	+.6	8	8.9	s.	40	w.	12	7	16	7	5.2	.0	.0	5
Knoxville [2]	995	66	84	28.97	30.04	+.01	57.0	−1.0	86	26	69	27	15	45	41	41	61	3.48	−.7	11	11.0	sw.	42	w.	6	12	6	17	5.6	T	.0	4
Memphis [2]	399	78	86	29.60	30.02	+.02	62.0	+.2	89	10	72	31	15	52	33	48	64	2.89	−1.9	8	8.7	sw.	24	sw.	16	12	11	7	4.7	.0	.0	5
Nashville [1]	546	5	72	29.44	30.03	+.02	57.8	.....	85	26	68	30	15	47	37	42	61	2.97	−1.2	11	10.6	s.	29	w.	12	10	13	7	5.5	T	.0	4
Lexington	989	6	...	28.93	.....	.....	50.8	−3.5	82	8	62	24	3	40	38	...	...	3.98	+.5	17	...	w.	...	...	...	10	9	11	...	.3	.0	4
Louisville [2]	525	106	120	29.45	30.02	+.01	53.0	−3.4	81	8	62	27	3	44	39	39	65	3.04	−.8	16	10.4	ne.	45	sw.	27	8	9	13	6.2	.2	.0	6
Evansville [1]	431	5	38	29.55	30.02	+.02	53.4	−1.5	82	8	64	27	3	43	36	40	64	3.61	−.3	14	10.8	nw.	34	n.	9	7	9	14	6.3	T	.0	6
Indianapolis [2]	823	98	129	29.12	30.02	+.02	47.7	−4.4	78	27	59	22	3	37	36	37	70	1.74	.....	12	12.7	nw.	35	sw.	16	8	7	15	6.3	T	.0	4
Terre Haute [2]	575	68	149	29.40	30.03	.....	51.4	.....	82	27	62	25	3	41	36	38	68	2.41	−1.2	15	11.7	nw.	32	nw.	30	9	6	15	5.8	.3	.0	4
Cincinnati [2]	627	11	51	29.33	30.02	+.01	49.8	−2.6	77	27	60	24	3	40	36	37	66	2.66	−.5	12	9.4	sw.	27	w.	12	9	8	13	6.2	.3	.0	6
Columbus [2]	822	90	110	29.12	30.01	−.01	47.0	−4.2	73	24	56	24	3	38	29	34	69	2.69	−.2	17	11.0	n.	39	w.	30	9	3	18	6.4	.8	.0	2
Dayton [2]	900	186	213	29.03	30.01	.....	45.7	−5.9	73	27	56	20	3	36	35	36	74	2.03	−1.2	16	11.8	nw.	34	sw.	16	7	6	17	6.8	.8	.0	4
Elkins	1,947	61	78	27.94	30.02	−.01	44.4	−4.4	74	27	57	17	4	32	43	33	68	3.86	+.2	17	8.7	w.	32	nw.	30	3	11	16	7.0	8.0	.0	2
Parkersburg	637	77	84	29.32	30.02	−.01	48.8	−4.6	79	27	59	24	4	38	37	35	63	4.06	+.9	15	7.7	nw.	31	w.	5	10	8	12	5.8	1.2	.0	2
Pittsburgh [1]	842	39	54	29.08	30.00	−.02	44.2	−5.5	74	27	54	20	15	34	31	30	64	2.38	−.5	13	13.4	nw.	42	nw.	5	7	9	14	6.5	2.3	.0	2

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean maximum+mean minimum+2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
Lower Lake Region							**40.2**	**−4.8**									**72**	**3.65**	**+1.1**										**6.5**			
Buffalo [2]	768	243	280	29.13	29.99	−.02	36.9	−5.9	68	23	44	17	6	30	26	29	74	3.72	+1.2	14	15.5	sw.	42	sw.	1	9	3	18	6.5	5.1	.0	2
Canton	448	10	61	29.43	29.93	.....	36.2	−6.3	68	24	45	10	6	27	31	29	76	2.68	+.5	17	9.9	w.	31	sw.	25	3	9	18	7.5	6.3	.0	0
Ithaca	836	77	100	.....	.....	.....	38.6	−6.4	69	24	47	15	6	30	37	.....	.....	3.98	+1.5	19	11.0	nw.	37	se.	12	6	2	22	7.7	5.7	.0	2
Oswego	335	71	85	29.58	29.95	−.06	37.4	−6.2	66	24	44	14	6	31	25	27	68	3.55	+1.2	16	10.9	w.	30	n.	3	8	6	16	6.8	11.1	.0	2
Rochester [1]	523	5	69	29.39	29.97	−.04	38.6	−4.9	71	24	47	17	6	30	33	29	73	4.81	+2.5	15	12.8	w.	42	w.	17	7	5	18	6.7	1.1	.0	3
Syracuse [1]	596	5	51	29.29	29.96	−.05	38.5	−4.5	68	24	47	13	7	30	37	30	73	4.65	+2.2	19	13.0	w.	37	s.	12	4	6	20	7.7	6.1	.0	1
Erie [2]	714	57	81	29.22	30.01	−.01	40.8	−4.3	64	27	48	23	6	33	23	31	74	4.02	+1.3	12	9.6	w.	28	se.	27	11	4	15	6.1	3.8	.0	1
Cleveland [1]	762	27	54	29.16	.....	.....	43.2	−3.0	76	27	53	23	14	33	32	32	70	3.43	+1.0	15	12.5	nw.	36	nw.	30	6	10	14	6.7	14.3	.0	2
Sandusky	629	5	67	.....	.....	.....	43.6	−3.6	79	27	52	25	15	35	37	.....	.....	2.91	+.4	13	11.0	nw.	32	nw.	30	10	6	14	5.8	.7	.0	1
Toledo [2]	628	79	87	29.31	30.01	.00	42.6	−5.0	77	27	54	18	6	32	39	32	71	2.88	+.2	12	14.0	nw.	47	sw.	16	15	9	6	4.3	T	.0	3
Fort Wayne [2]	857	69	84	29.08	30.01	.....	43.9	−4.8	76	27	55	21	3	33	40	33	70	3.01	−.1	14	10.9	nw.	34	w.	27	7	8	15	6.4	.8	.0	3
Detroit [1]	730	5	78	29.20	30.01	−.01	42.4	−3.2	73	24	52	22	6	33	33	30	66	4.11	+1.6	11	11.8	nw.	42	w.	4	8	8	14	6.3	6.8	.0	2
Upper Lake Region							**39.4**	**−1.9**									**69**	**1.97**	**−0.5**									**5.9**			
Alpena	609	5	89	29.33	30.02	.00	36.8	−1.8	76	24	44	16	15	29	36	27	75	2.02	−.2	13	13.1	nw.	38	nw.	5	7	10	13	6.3	13.7	.0	1
Escanaba	612	51	72	29.35	30.04	+.02	35.4	−2.5	60	24	43	15	3	28	23	27	72	1.45	−.8	12	12.2	s.	42	nw.	4	8	10	12	6.1	5.2	.0	.0
Grand Rapids [2]	707	70	244	29.24	30.02	.00	43.2	−3.8	71	24	53	22	3	34	31	29	67	2.36	−.4	9	12.7	n.	37	s.w.	27	10	7	13	5.4	3.2	.0	0
Lansing [2]	878	5	90	29.05	30.02	.....	41.2	−4.4	72	24	51	19	6	31	35	30	67	2.81	+.2	10	10.4	nw.	30	w.	27	10	8	12	5.6	5.2	.0	1
Ludington	637	60	66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marquette	734	44	73	29.21	30.03	+.01	36.8	−1.0	77	24	44	16	3	29	28	25	65	2.10	−.3	14	9.7	nw.	30	sw.	24	7	13	10	5.8	12.2	T	0
Sault Ste. Marie [1]	614	11	43	29.33	30.07	+.04	33.5	−3.0	67	24	42	11	15	25	34	24	72	1.80	−.3	10	12.5	nw.	42	nw.	25	6	9	15	6.5	12.5	T	1
Chicago [1]	673	19	38	29.28	30.02	+.02	45.6	−1.3	74	24	56	23	14	36	32	33	67	3 37	+.8	14	11.6	ne.	34	nw.	16	7	14	9	5.9	.3	.0	6
Green Bay	617	109	141	29.35	30.03	+.02	41.0	−2.2	71	24	49	22	3	33	29	30	70	1.53	−1.1	10	12.4	s.	34	w.	4	4	15	11	6.2	4.2	.0	1
Milwaukee [1]	681	33	66	29.28	30.03	+.04	42.6	+.4	74	24	52	23	14	33	33	31	66	.99	−1.7	12	14.2	nw.	40	w.	27	4	16	10	5.9	T	.0	3
Duluth	1,133	5	47	28.79	30.04	+.03	38.1	+1.1	76	24	47	14	2	29	30	26	67	1.24	−.8	11	13.6	ne.	46	nw.	4	10	8	12	5.4	1.1	.0	0
North Dakota							**45.3**	**+5.1**									**59**	**1.13**	**−0.4**									**4.9**			
Fargo, N. Dak. [1]	940	5	43	28.99	30.02	+.03	43.8	+3.2	78	21	56	19	2	32	42	31	63	1.05	−1.1	5	16.4	n.	42	nw.	4	11	12	7	4.7	T	.0	0
Bismarck [1]	1,677	4	41	28.20	30.00	+.03	47.0	+7.7	81	23	61	21	13	33	46	31	59	.87	−.6	7	14.0	nw.	38	w.	24	11	11	8	4.8	T	.0	0
Devils Lake	1,478	11	44	28.43	30.03	+.04	43.0	+4.2	77	21	55	17	1	31	38	27	60	1.45	−.1	5	11.5	nw.	34	nw.	4	11	12	7	5.1	T	.0	1
Grand Forks	832	11	71	29.12	30.04	.....	41.5	.....	76	21	53	16	2	30	41	30	.....	1.85	.....	4	.....	n.	.....	.....	.....	.....	10	10	.....	T	.0	0
Lemmon, S. Dak.	2,602	4	38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Williston	1,878	42	80	27.99	29.99	+.03	47.3	+5.3	79	23	60	20	14	35	43	28	54	1.15	.0	8	9.7	se.	34	nw.	21	10	17	3	4.9	T	.0	1
Upper Mississippi Valley							**49.2**	**−1.1**									**64**	**3.02**	**0.0**									**5.6**			
Minneapolis-St. Paul, Minn. [1]	919	32	61	29.02	30.03	+.04	44.4	−2.0	77	24	55	20	2	34	37	31	61	.98	−1.2	5	12.8	nw.	40	nw.	4	10	8	12	5.4	T	.0	2
Springfield, Minn.	1,025	4	42	28.91	30.02	.....	45.8	.....	78	24	58	22	13	34	48	30	58	.84	.....	5	.....	nw.	.....	.....	.....	.....	10	8	12	.....	T	.0	1
La Crosse [2]	714	11	48	29.24	30.02	+.04	44.4	−2.8	75	9	56	20	15	33	40	30	62	.74	−1.7	7	11.8	nw.	38	nw.	4	12	7	11	5.1	T	.0	2
Madison [2]	974	70	78	28.96	30.03	+.04	44.2	−1.2	72	24	53	23	14	35	27	31	64	1.93	−.8	12	10.5	nw.	36	ne.	19	6	15	9	5.7	T	.0	4
Charles City	1,015	10	51	28.95	.....	.....	45.9	−.5	78	24	57	23	14	35	40	.....	.....	1.31	−1.2	6	8.2	nw.	24	se.	15	13	8	9	4.8	T	.0	4
Davenport [2]	606	66	161	29.37	30.03	+.05	49.4	−.5	75	24	59	28	14	39	30	35	65	6.21	+3.5	13	11.7	nw.	30	nw.	4	10	10	10	5.5	T	.0	5
Des Moines [2]	860	5	99	29.09	30.02	+.05	49.8	−.3	82	24	60	25	14	39	44	35	63	3.26	+.4	10	11.8	n.	32	nw.	29	10	10	10	5.5	T	.0	6
Dubuque [1]	699	60	79	29.27	30.02	+.04	47.8	−.8	75	24	58	26	15	38	33	32	61	3.27	+.4	13	8.2	nw.	24	se.	29	9	9	12	5.6	T	.0	5
Burlington	702	6	35	29.26	30.03	+.05	49.8	−1.6	77	24	61	23	15	38	38	35	66	4.55	+1.4	14	11.3	nw.	40	sw.	15	8	14	8	5.6	T	.0	7
Cairo	357	5	99	29.65	30.03	+.04	58.3	+.2	84	29	68	33	15	49	32	.....	.....	3.24	−.5	15	10.7	sw.	28	sw.	16	6	12	12	6.1	.0	.0	5
Peoria [2]	609	11	45	29.37	30.03	+.04	48.8	−2.1	78	8	60	22	14	37	37	36	68	5.38	+2.0	17	7.8	se.	22	nw.	30	11	10	9	5.5	.2	.0	4
Springfield, Ill. [2]	636	5	191	29.33	30.03	+.05	51.9	−.8	78	27	63	27	3	41	33	38	70	3.44	−.1	14	12.9	nw.	31	nw.	30	7	8	15	6.4	T	.0	7
St. Louis [2]	568	179	303	29.41	30.03	+.05	55.2	−.9	83	29	65	30	14	46	34	41	66	1.87	−1.9	11	13.8	nw.	40	sw.	4	7	11	12	5.7	T	.0	4
Missouri Valley							**53.3**	**+2.5**									**57**	**1.84**	**−1.0**									**5.4**			
Columbia, Mo. [2]	784	6	66	29.17	30.00	+.02	55.0	+.1	84	29	66	28	14	44	40	39	62	2.16	−1.6	8	9.6	nw.	24	nw.	13	10	13	7	5.1	T	.0	4
Kansas City [1]	963	38	76	28.98	30.01	+.05	57.2	.....	90	29	69	31	14	46	43	40	59	1.75	.....	10	12.2	nw.	36	nw.	29	9	13	8	5.3	T	.0	7
St. Joseph [2]	967	11	49	28.97	30.00	.....	55.4	+1.9	91	29	67	30	14	44	44	37	57	1.41	−1.8	10	10.8	nw.	31	w.	12	15	10	5	3.9	.0	.0	5
Springfield, Mo. [1]	1,324	5	60	28.61	30.01	+.04	55.8	+.6	82	10	67	28	14	45	36	42	65	3.84	.0	12	13.4	se.	44	nw.	11	11	7	12	5.5	.0	.0	9
Topeka	987	65	87	28.94	29.99	.....	57.9	+3.2	92	29	70	30	14	45	46	39	56	1.40	−1.4	7	10.8	e.	30	s.	29	11	14	5	4.7	.0	.0	5
Lincoln [2]	1,189	11	81	28.74	30.01	+.07	53.7	+2.2	85	24	66	26	14	42	48	33	54	1.44	−1.1	6	11.1	n.	30	nw.	13	10	8	12	5.4	.0	.0	6
Omaha [1]	1,105	31	44	28.83	30.01	+.06	53.4	+4.1	84	24	64	29	14	42	46	34	55	2.45	−.1	8	15.0	n.	46	n.	4	7	13	10	6.1	.0	.0	6
Valentine	2,598	46	54	27.28	29.99	+.05	51.2	+5.5	85	3	64	22	14	38	50	28	46	1.89	.0	4	11.8	n.	42	sw.	26	7	6	17	6.6	.0	T	3
Sioux City [1]	1,138	5	27	28.80	30.02	+.07	49.4	+2.2	86	24	63	23	15	36	37	32	57	1.65	−1.0	6	13.3	se.	38	n.	15	8	8	14	6.0	.0	.0	3
Huron [1]	1,301	5	41	28.61	30.01	+.05	47.6	+2.5	82	15	62	18	14	34	34	33	62	.35	−1.9	6	16.1	se.	42	s.	3	9	9	12	5.7	.0	.0	3
Northern Slope							**50.3**	**+5.8**									**57**	**1.80**	**+0.3**									**6.8**			
Billings [1]	3,570	18	39	26.28	29.93	.....	51.8	+5.8	82	23	64	30	14	40	41	32	53	.49	.....	8	11.7	sw.	41	nw.	24	4	8	18	7.0	.0	.0	0
Havre	2,507	11	67	27.33	29.96	+.03	50.3	+6.6	86	19	64	27	14	37	52	31	51	1.20	+.2	8	10.1	sw.	35	w.	24	6	9	15	6.9	.0	.0	0
Helena [1]	4,124	5	35	25.78	29.98	+.01	47.3	+3.8	76	23	60	23	4	35	45	31	58	1.45	+.3	7	9.1	w.	48	sw.	19	5	8	17	7.0	2.3	.0	0
Missoula [2]	3,205	80	91	26.63	30.01	.....	49.2	+4.0	81	18	62	28	4	37	41	34	65	3.15	+2.1	9	6.5	w.	37	nw.	23	7	6	17	6.4	T	.0	0
Kalispell	2,973	48	56	26.91	29.96	.00	47.8	+4.2	77	14	59	27	4	36	39	32	61	1.13	+.3	5	6.7	w.	29	sw.	23	5	11	14	6.8	T	.0	0
Miles City [2]	2,371	48	55	27.48	29.97	+.01	51.8	+7.1	86	23	66	21	14	37	50	33	57	.29	.....	4	.....	n.	.....	.....	.....	6	5	19	.....	.0	.0	0
Rapid City [2]	3,259	50	58	26.61	29.98	+.03	50.2	+5.9	82	3	64	20	14	37	45	31	54	1.10	−.3	9	17.4	s.	49	nw.	26	6	12	12	6.4	T	.0	0
Cheyenne [1]	6,094	5	39	23.99	29.93	+.02	48.2	.....	77	23	62	27	14	35	43	32	60	1.34	−.6	10	11.5	nw.	43	nw.	26	5	7	18	7.2	4.0	.0	3
Lander	5,352	60	68	24.63	29.90	−.04	49.8	+7.4	76	23	63	24	12	36	39	30	52	2.91	+.8	4	5.8	w.	33	sw.	25	7	11	12	6.1	6.5	.0	3
Sheridan [2]	3,790	6	42	26.09	29.95	.....	51.2	+7.9	81	23	65	30	14	37	46	33	58	1.61	−.3	12	11.5	nw.	47	nw.	12	5	8	17	7.3	T	.0	2
North Platte [2]	2,821	11	51	27.06	29.97	+.05	53.4	+4.8	83	15	66	27	14	41	47	33	55	2.33	+.3	6	9.8	s.	28	n.	12	7	8	15	6.5	T	.0	3
Middle Slope							**58.9**	**+4.8**									**55**	**1.54**	**−1.0**									**5.6**			
Denver [2]	5,292	106	113	24.72	29.92	+.02	55.2	+8.1	84	28	66	35	11	44	40	31	50	.93	−1.1	7	7.5	s.	26	nw.	24	6	15	9	5.8	.0	.0	5
Pueblo [1]	4,690	5	36	25.26	29.90	+.02	56.0	+6.6	88	24	72	31	1	40	51	32	50	.56	−.8	4	8.4	nw.	31	sw.	28	6	9	15	6.6	.0	.0	3
Concordia	1,392	50	58	28.53	30.00	+.07	56.2	+2.7	84	29	69	30	14	44	43	37	55	2.29	−.1	10	9.6	se.	29	n.	4	10	8	12	5.5	.0	.0	6
Dodge City [1]	2,509	10	86	27.37	29.95	+.05	57.8	+4.2	90	3	72	30	14	44	46	38	56	1.30	−.6	8	16.0	se.	45	n.	4	6	15	9	5.9	.0	.0	4
Wichita [1]	1,358	6	64	28.55	29.97	+.04	59.6	+3.2	89	29	72	32	19	47	38	40	57	1.94	−1.0	5	16.7	s.	41	sw.	15	10	11	9	5.3	.0	.0	5
Oklahoma City [2]	1,214	10	47	28.68	29.95	+.03	64.8	+5.0	89	4	76	38	19	54	33	46	58	2.79	−.5	8	10.1	s.	23	sw.	15	12	11	7	4.8	.0	.0	3
Tulsa	674	10	61	29.27	29.97	.....	63.0	+4.1	90	4	75	36	20	51	40	45	57	.97	−3.2	6	13.3	s.	54	nw.	11	11	9	10	5.3	T	.0	5

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Thermometer above ground	Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Sea level, reduced to mean of 24 hours	Departure from normal	Temperature of the air: Mean maximum+mean minimum+2	Departure from normal	Maximum	Date	Mean maximum	Minimum	Date	Mean minimum	Greatest daily range	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Departure from normal	Days with 0.01 inch or more	Wind: Average hourly velocity	Prevailing direction	Maximum velocity: Miles per hour	Direction	Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	%	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
Southern Slope							67.5	+4.6									52	0.84	−1.0											4.2		
Abilene [2]	1,738	10	56	28.14	29.90	.00	70.4	+6.0	99	25	83	42	18	58	35	50	60	.68	−2.0	4	11.3	s.	27	se.	15	20	3	7	3.7	.0	.0	5
Amarillo [3]	3,676	10	49	26.24	29.90	+.03	60.8	+5.0	92	29	76	36	20	46	42	36	49	1.06	−.8	4	15.9	se.	46	ne.	16	11	13	6	4.4	.0	.0	4
Del Rio	960	63	71	28.92	29.88	−.01	74.4	+3.8	96	25	86	56	12	63	30	54	55	1.37	−.4	2	11.1	se.	32	e.	7	7	14	9	5.3	.0	.0	5
Roswell	3,566	75	85	26.33	29.87	+.02	64.4	+3.8	96	24	81	40	13	48	45	34	42	.23	−.7	3	7.9	s.	31	sw.	10	17	10	3	3.4	.0	.0	3
Southern Plateau							66.8	+5.2									34	0.09	−0.2										2.8		
El Paso [1]	3,778	82	101	26.12	29.81	−.02	67.3	−4.8	95	29	83	41	12	52	39	30	27	T	−.3	0	10.2	sw.	36	sw.	21	19	9	2	2.6	.0	.0	0
Albuquerque [1]	5,314	5	45	24.71	29.83	.....	60.9	+6.9	88	29	76	34	12	46	39	27	33	.06	−.5	2	10.4	se.	45	e.	30	14	12	4	4.3	.0	.0	1
Phoenix [2]	1,107	39	87	28.72	29.83	−.04	71.8	+4.8	102	30	88	44	10	56	46	36	36	.14	−.3	3	5.1	e.	24	sw.	6	18	9	3	2.7	.0	.0	2
Tucson [1]	2,555	5	23	27.28	29.84	.....	70.4	.....	102	30	87	42	8	54	42	32	29	.03	−.3	1	.....	nw.	.....	.....	.....	18	9	3	2.8	.0	.0	0
Yuma	142	9	54	29.71	29.83	−.06	73.4	+3.9	103	30	90	44	10	57	44	42	41	T	−.1	0	6.0	w.	29	w.	8	25	4	1	1.4	.0	.0	0
Independence	3,957	5	26	25.93	29.91	+.01	60.8	+5.7	86	23	75	36	9	46	37	31	37	.31	+.2	2	.....	nw.	.....	.....	.....	7	15	8	.....	.0	.0	0
Middle Plateau							53.7	+5.6									48	0.90	0.0										5.8		
Reno	4,527	61	76	25.44	29.95	−.02	50.8	+3.3	80	14	67	22	26	34	48	31	54	.44	.0	5	9.0	nw.	34	se.	23	7	15	8	5.5	T	.0	1
Tonopah	6,090	9	20	23.99	29.88	.....	52.0	+4.3	77	23	63	26	9	41	32	29	49	1.40	+.9	6	.....	nw.	.....	.....	.....	9	12	9	.....	4.0	.0	3
Winnemucca	4,339	5	56	25.58	29.92	−.04	52.5	+5.8	80	18	68	26	26	37	43	31	51	.53	−.3	6	8.5	sw.	26	sw.	25	7	12	11	5.7	T	.0	0
Modena	5,473	10	46	.....	.....	.....	50.9	+4.9	80	30	67	18	10	35	47	.....	.....	1.66	+.8	7	10.2	sw.	34	sw.	25	8	13	9	5.2	1.4	.0	7
Salt Lake City [1]	4,227	32	46	25.56	29.89	−.03	55.6	+7.7	82	23	68	33	12	43	37	35	51	1.14	−.6	8	9.1	se.	45	nw.	25	7	8	15	6.5	T	.0	3
Grand Junction	4,602	60	68	25.32	29.86	−.02	60.3	+7.9	87	30	74	31	11	47	35	28	34	.20	−.6	3	7.0	se.	34	sw.	25	9	8	13	5.9	T	.0	2
Northern Plateau							52.5	+3.6									58	1.16	0.0										6.1		
Baker [2]	3,471	36	54	26.42	29.99	−.01	47.8	+2.6	78	14	61	27	4	35	41	34	66	1.07	.0	10	6.9	n.	26	sw.	18	7	12	11	5.9	.2	.0	0
Boise [1]	2,739	5	49	27.11	29.92	−.06	54.0	+4.9	84	18	67	30	26	41	38	37	55	1.39	+.2	7	10.5	se.	42	w.	19	6	11	13	5.9	.0	.0	0
Pocatello [1]	4,478	5	31	25.43	29.91	−.03	52.4	+7.5	77	30	66	31	12	39	41	32	52	.36	−1.1	4	10.0	sw.	38	w.	28	4	11	15	6.5	.4	.0	3
Spokane [1]	1,929	27	42	27.95	29.98	−.01	50.4	+2.0	81	18	62	30	4	39	42	38	67	1.33	+.2	9	7.1	sw.	39	w.	23	7	7	16	6.6	.0	.0	0
Walla Walla	991	57	65	28.95	30.00	−.01	55.6	+2.5	85	14	65	36	4	46	31	.....	.....	2.34	+.8	10	6.3	s.	26	w.	23	10	9	11	5.6	.0	.0	0
Yakima	1,076	58	67	28.85	29.99	.....	54.8	+2.3	86	13	66	33	22	44	34	35	51	.50	.0	10	6.6	nw.	29	sw.	23	8	6	16	6.3	.0	.0	0
North Pacific Coast Region							52.6	+2.8									72	3.42	+0.4										6.7		
North Head	211	5	56	29.81	30.03	−.02	49.4	+1.9	74	12	54	39	2	44	25	44	82	3.19	−1.0	15	16.0	s.	77	s.	23	3	5	22	7.8	.0	.0	0
Seattle [3]	125	90	321	29.90	30.02	−.01	53.6	+2.5	77	13	62	39	3	46	27	41	67	2.43	.0	11	10.8	s.	60	s.	23	6	10	14	6.5	.0	.0	0
Tacoma	194	172	201	29.84	.....	.....	52.2	+3.5	78	13	60	38	22	44	26	.....	.....	2.74	.0	16	9.0	n.	49	s.	23	6	12	12	6.1	.0	.0	1
Tatoosh Island	86	9	61	29.92	30.00	.00	48.4	+2.3	61	11	53	40	23	44	16	42	80	7.67	+2.0	17	15.3	e.	51	s.	1	6	3	21	7.5	.0	.0	0
Medford [1]	1,329	29	58	28.62	30.02	.....	54.2	+2.1	86	13	66	29	26	42	41	41	67	2.17	+.9	15	.....	nw.	.....	.....	.....	7	7	16	6.5	.0	.0	1
Portland, Oreg [3]	154	68	106	29.87	30.03	−.03	55.6	+3.8	85	12	64	39	26	47	33	43	70	2.56	−.3	15	6.1	nw.	21	w.	18	6	11	13	6.0	.0	.0	0
Roseburg	510	45	76	29.51	30.05	−.02	54.6	+3.6	87	12	66	31	26	44	41	43	68	3.19	+.9	16	4.3	nw.	24	sw.	27	6	6	18	6.8	.0	.0	2
Middle Pacific Coast Region							56.7	+1.0									74	2.88	+0.6										6.5		
Eureka	60	72	88	30.04	30.10	−.01	52.0	+2.1	68	22	57	40	26	47	25	47	85	3.23	−.1	16	8.4	n.	30	n.	9	3	6	21	7.6	.0	.0	0
Redding [1]	722	20	34	29.23	29.99	.....	59.8	.0	91	13	69	42	9	51	37	44	60	4.52	+1.9	13	7.2	nw.	22	n.	9	7	5	18	6.6	.0	.0	1
Sacramento [3]	66	92	115	29.95	30.00	−.01	59.3	+1.2	80	13	70	41	9	49	31	48	71	1.91	+.4	5	7.4	s.	24	nw.	9	7	13	10	5.4	.0	.0	0
San Francisco	155	112	132	29.88	30.04	−.01	55.6	+.6	72	22	61	46	9	50	19	47	79	1.88	+.3	9	9.5	w.	28	w.	24	4	14	12	6.3	.0	.0	0
South Pacific Coast Region							61.5	+2.1									68	0.64	−0.2										5.7		
Fresno [1]	327	5	35	29.62	29.96	−.03	62.1	+1.9	87	30	75	41	26	49	36	46	61	.90	.0	4	7.1	nw.	30	nw.	8	6	13	11	5.8	.0	.0	0
Los Angeles	338	223	250	29.63	29.97	−.02	61.4	+2.0	86	1	70	44	9	53	27	49	71	.50	−.5	4	6.3	w.	32	w.	8	9	14	7	5.3	.0	.0	2
San Diego [1]	87	20	55	29.90	29.98	−.01	61.0	+2.5	81	1	68	48	11	54	30	51	73	.52	−.2	4	7.4	w.	24	w.	8	8	.....	9	13	6.1	.0	.0	0
West Indies																																
San Juan, P. R.	82	10	54	29.89	30.00	.....	77.0	+.4	90	24	82	69	3	72	18	70	79	5.61	+1.2	14	11.3	e.	31	e.	1	4	1	8	5.8	.0	.0	1
Panama Canal																																
Balboa Heights	118	6	92	.....	[4] 29.85	+.03	82.0	+.4	95	20	90	72	26	74	21	.....	[5] 81	3.60	+.7	9	6.9	nw.	24	n.	22	3	1	16	6.9	.0	.0	3
Cristobal	36	6	97	.....	[4] 29.87	+.02	82.2	+.4	90	25	86	75	27	78	15	74	[5] 78	3.92	+3.8	14	10.9	n.	22	n.	15	4	1	15	6.7	.0	.0	2
Alaska																																
Nome	22	25	56	.....	[4] 29.73	.....	21.2	+1.3	47	30	29	−24	6	13	.....	.....	82	.29	−.4	11	8.8	ne.	29	e.	8	7	9	14	.....	2.1	1.4	0
Fairbanks	455	4	82	.....	[4] 29.74	.....	30.6	+1.0	66	29	44	−27	1	17	.....	18	58	.05	−.2	3	5.5	e.	26	sw.	29	8	9	13	.....	.2	.0	0
Juneau	80	96	116	.....	[4] 29.84	.....	42.4	+1.6	62	27	48	32	5	37	.....	33	70	8.23	+2.8	23	7.3	se.	26	se.	19	2	2	26	.....	4.9	.0	0
Anchorage	132	6	47	.....	[4] 29.65	.....	34.8	−.6	59	29	45	9	1	24	.....	24	62	.17	−.2	1	5.0	n.	24	sw.	13	3	4	23	.....	3.1	.0	0
Hawaiian Islands																																
Honolulu	38	86	100	30.05	30.09	.....	74.8	+1.8	83	25	65	79	11	70	14	.....	.....	.34	−1.8	8	10.3	ne.	24	ne.	14	13	16	1	4.3	.0	.0	0

LATE REPORTS FOR MARCH 1943

Alaska																																
Bethel	22	5	32	[4] 30.04	.....	.....	17.2	+5.0	40	5	23	−14	22	11	29	13	80	2.35	+1.5	13	.....	n.	.....	.....	.....	12	3	16	6.2	9.1	5.9	0
Gambell	27	4	30	[4] 30.12	.....	.....	11.6	+3.8	34	15	17	−9	25	6	21	10	89	.82	.....	11	19.5	ne.	42	s.	16	11	6	14	7.6	7.1	10.1	0
Ketchikan	75	69	85	[4] 29.88	.....	.....	37.0	−.8	55	1	44	24	8	30	24	29	74	4.65	−7.3	15	5.9	s.	25	s.	20	7	4	20	7.2	16.2	T	0
Kotzebue	20	4	31	[4] 30.12	.....	.....	1.6	+2.1	34	15	12	−43	22	−8	40	0	92	.42	+.2	11	.....	w.	47	e-se.	13	10	7	14	6.0	4.1	9.7	0
McGrath	331	4	31	[4] 29.67	.....	.....	13.8	.....	41	5	23	−25	25	5	36	8	72	1.62	.....	11	.....	n.	31	s.	5	10	7	14	6.1	18.5	22.2	0
Northway	.....	5	32	[4] 28.12	.....	.....	7.0	.....	39	16	20	−37	23	−6	42	.....	81	.25	.....	9	.....	nw.	.....	.....	.....	3	14	14	.....	4.1	9.9	0

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken bi-hourly.
[4] Pressure not reduced to a mean of 24 hours.
[5] Wind, clear, partly cloudy, and cloudy data from city office records; other data from airport.
[6] Temperature, pressure (adjusted to old city elevation), and hygrometric data from airport; otherwise city office records.

NOTE.—Except as indicated by notes 1, 2, 5, and 6 data in table are city office records.

SEVERE LOCAL STORMS, APRIL 1943

[Compiled by Mary O. Souder]

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Arkansas, scattered sections of State.	11					Hail and wind	Most serious damage to crops and fruit trees in eastern Arkansas as result of heavy hail. Hail struck portions of Little Rock and an area north of Hot Springs. A wind storm south of Hot Springs smashed a number of garages and outbuildings, moved a residence off its foundation and uprooted trees. There were no casualties reported.
Keota, Colo.	12					Tornadic winds	House destroyed, other buildings damaged or destroyed, amount not estimated.
Hacklebury, Ala., and vicinity.	13			4	$250,000	Tornado	40 persons injured and many homeless. $250,000 amount of damage in Hacklebury only.
Roxobel, N. C.	19	P. m.	150	7	100,000	do	Practically all the community's residents of 500 persons sustained some property loss; 15 persons injured.
Evansville, Ind.	27	6:15 p. m., C. W. T.	1,320		150,000	Hail	The hailstorm accompanied a moderate thunderstorm with little lightning and thunder moving from west to east between 5:50 to 6:45 p. m., C. W. T. The falling hail caused such a roar that the approach of the storm could be heard several minutes before large hailstones began falling, a few stones at first building up rapidly in volume and noise of bouncing hail and breaking glass. This undoubtedly was probably the severest and most destructive hailstorm experienced in Evansville. Hardly a building, including homes, schools, factories, churches, and greenhouses located within the path of the hailstorm escaped damage to windows, roofs or both. Much damage to composition roofs varying from slight to almost complete destruction. One large electric sign company estimated that the damage to neon signs alone was $50,000.
Cuyahoga County, Ohio.	27	8:25–8:40 p. m.	Less than 100 yards.	0	800,000 to 1,000,000.	Tornado	Damage chiefly to dwellings and commercial buildings in Cleveland and vicinities. The trail of damage was over a thickly settled city terrain and passed about 2 miles south of the public square which is the center of downtown Cleveland. Thunderstorms and squalls were experienced all over the city and county and considerable hail of small size was reported from various locations east of the Cuyahoga River and north of the track of the tornado. Lightning damaged at least 2 residences and probably others.
Semmesport, La., and vicinity.	2	3:30–4:30 p. m.			500	Hail	Loss in maturing crops.
Lake Ontario, N. Y.	5–6				10,000	Wind	Partially due to record high water in the lake, high winds caused a heavy pounding of shore installations along the southern and eastern shores of Lake Ontario. Damage to docks, cottages, and boathouses amounted to several thousands of dollars.
Jarrell, Tex.	8	6:30 a. m.	440	0	3,500	Tornado	No crop loss: 1 person injured.
Frost, Tex.	8	8:45 a. m.	33	0	5,000	do	Several houses and outbuildings damaged; no crop loss.
Montopolis, Tex.	8	8:50–9:14 a. m.	7	0	500	do	Small damage to house and outbuildings.
Bardwell, Tex.	8	9 a. m.	100	0		do	Property damage not estimated; no crop loss.
Whitewright, Tex.	8	2:15 p. m.	100	1		do	Several houses destroyed; 12 damaged; amount not estimated. No crop loss.
Elm Mott, Tex.	8					do	1 person injured; no details.
Anson, Tex.	9	4–6 p. m.	[1] 5–10	0	3,000	Hail	Loss to gardens and fruit.
Daviess and Greene Counties, Ind.	9	9:30 p. m.	10	0	500	Wind and hail	Property damaged.
Decker, Ind.	9				10,000	Hail	Damage to roofs and glass in hot beds.
Brighton, Colo.	10	1:30 p. m.				Heavy hail	Damage to greenhouses, plate glass, plants and roofs. Ground covered 4 to 5 inches with hailstones and snow plows used to clean the streets. Estimated damage several thousands of dollars.
Platteville, Colo.	10	2:10 p. m.			900	Wind and hail	Considerable damage to buildings, roofs, corrals, pens, and outbuildings. Winds reached tornadic proportions.
Milliken, Colo.	10	2:30 p. m.	2,640			Tornadic winds	Roofs blown off; silos blown down; garages flattened and tractors turned over. High winds were accompanied by rotating cloud formation. Damage not estimated.
DeSota, Marshall, Benton, Tippah, and Alcorn Counties, Miss.	11	4:30–6:30 p. m.	[1] 1–3			Heavy hail	Storm moved from west to east, traveling a distance of approximately 100 miles damaging roofs, windows, early gardens, trees, and shrubbery, and killing considerable poultry.
Poteau, Okla.	11	P. m.	80	0		Tornado	20 dwellings demolished; 80 persons homeless, and 5 persons injured, 2 seriously.
Akron, Ohio, and vicinity.	27	P. m.	100–200	2	2,500,000	do	The first damage was reported between 8 to 8:15 p. m., E. S. T. Damage for the entire Akron area included all of Summit County and adjacent portions of Medina and Portage Counties. 955 building units of all types were damaged including factories, homes and smaller buildings. 67 houses were entirely demolished of which 12 were of good construction, 28 medium and 27 poorly constructed. 2 barns were also destroyed. 100 or more injured persons required hospital care. 536 garages totally destroyed. Insurance companies have already reported from 4,000 to 5,000 claims and probably will receive many more of a minor nature. Numerous tornado freaks were observed such as the lifting or carrying away of automobiles, lifting or turning of heavy railroad cars, etc. Several thousand trees were uprooted or twisted off and an unknown number of telephone poles.
Howell, Mich., vicinity of.	27				75,000	Thundersquall	Barns, houses, garages, and other small farm buildings, power lines, 4 airplanes on the ground, and 3 hangars damaged, and 2 persons injured. Scattered lightning and hail damage, the latter chiefly to windows, were also reported.
New York State, western portion.	27			1	14,000	Electrical	A sudden, heavy, electrical storm caused some swollen streams and resultant flood damage in western New York. At Lake Chautauqua a man was killed by lightning. Near Lockport, 2 barns burned resulting in an estimated loss of $14,000.
Tulare Lake, Calif., and vicinity.	27–28				1,040,000	Rain and flood	Heavy rains caused Tulare Lake to rise and washing by waves on windy days caused breaks in the levees. As a result 10,000 acres were flooded destroying prospective crops, some of them nearly matured. Loss of crops and use of land, repairs to levees, and cost of pumping the water back into Tulare Lake reported in the estimated loss.
Medway to Enon, Ohio, and vicinities.	28	6:20 E. S. T.	25	0	25,000	Tornado	A well-defined funnel cloud observed. Damage confined to farm buildings and barns which were scattered for a considerable distance in the path of the storm.
Kershaw, S. C.	30				1,000	Electrical	Barns and contents a total loss.

[1] Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR APRIL 1943

[Solar Radiation Investigations Section, I. F. HAND, in charge]

SOLAR RADIATION OBSERVATIONS

Explanations of the tables and references to descriptions of instruments, stations and methods of observation, and to summaries of data, are given in the January 1942 REVIEW, page 20; a list of pyrheliometric stations is also given in the REVIEW for January 1943, page 12.

TABLE 1.—*Solar radiation intensities during April 1943*

[Gram calories per minute per square centimeter of normal surface]

MADISON, WIS.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Apr. 2	2.49	0.81	0.98	1.13	1.31						2.74
Apr. 3	2.74	.68	.84	0.99	1.24						2.87
Apr. 5	2.74	.79	1.03	1.16	1.33	1.52	1.33				2.49
Apr. 7	5.82						1.01				6.55
Apr. 8	4.37	.62	.75	.81	0.96	1.40					4.57
Apr. 10	4.19				1.08	1.52					4.19
Apr. 12	4.57	.79	.90	.99	1.31	1.53					3.81
Apr. 14	1.96	.84	.98	1.11	1.33	1.55					2.49
Apr. 15	2.36	.74	.87	.96	1.24	1.47					2.36
Apr. 16	5.18	.57	.76	.94	1.19	1.40					4.78
Apr. 17	3.63	.71	.90	1.01	1.21	1.48					3.81
Apr. 21	3.99		.74	.86	1.13	1.39					3.63
Apr. 22	4.78		.65	.80	1.04	1.25					5.59
Apr. 24	6.30		.83	.95	1.14	1.40					6.55
Apr. 26	4.98	.80	.91	1.07	1.25	1.45					5.82
Apr. 28	4.57	.65	.88	1.10	1.24	1.45					6.04
Means		.73	.86	.99	1.20	1.45	(1.17)				
Departures		−.02	−.03	−.04	.00	+.02	−.02				

LINCOLN, NEBR.

Apr. 3	2.62			0.70	0.90						4.19
Apr. 5	2.87			.94	1.18						2.49
Apr. 13	3.48			1.16	1.31	1.52					2.62
Apr. 14	2.87			1.11	1.27		1.24	1.05	0.92	0.81	2.15
Apr. 15	3.63			.99	1.18	1.43	1.14	0.99	.84	.71	7.06
Apr. 16	4.19					1.39	1.16	.96	.83	.73	3.02
Apr. 17	3.48				1.14	1.41	1.01				3.63
Apr. 18	4.37						1.11	.90	.75		4.37
Apr. 19	2.74				1.29	1.53	1.09	.85	.64	.52	2.06
Apr. 20	3.02				1.01	1.47	1.13	.96	.83	.71	3.48
Apr. 23	4.57				1.22	1.41	1.12	.92	.77	.67	2.61
Apr. 24	5.38				.99						7.34
Apr. 27	5.18				.99						5.59
Apr. 28	5.38				1.16						5.38
Means				.98	1.15	1.45	1.12	.95	.80	.69	
Departures				.00	−.04	−.01	−.05	−.01	−.02	.00	

TABLE 1.—*Solar radiation intensities during April 1943*—Con.

[Gram calories per minute per square centimeter of normal surface]

BLUE HILL, MASS.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.					P. M.				Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Apr. 2	4.4	0.81	0.93	1.06							6.1
Apr. 4	2.1			1.14	1.31	1.57	1.30	1.12	0.98		1.8
Apr. 6	2.4						1.13	0.95		0.73	1.8
Apr. 7	1.6	.92	1.03	1.17	1.30						0.9
Apr. 9	4.4	.51	.65	0.93	1.02						3.8
Apr. 12	3.2	.81	.90	1.04	1.20						2.6
Apr. 15	2.4	.80	.92	1.04	1.19						2.1
Apr. 16	2.7	.74	.85	.98	1.16						3.3
Apr. 22	6.6							1.07	.91	.81	7.4
Apr. 23	5.8	.72	.85	1.00	1.18	1.38	1.14+	.76+	.68+	.57+	4.6
Apr. 24	5.6	.60	.69	.83	1.01						4.2
Apr. 26	6.9	.32	.45	.62	0.91						3.2
Apr. 29	5.3				1.25		1.22	1.04	.93	.81	3.7
Means		.69	.81	.98	1.15	(1.48)	1.20	.99	.88	.73	
Departures		−.10	−.08	−.05	−.03	[1].10	[1].08	[1].04	[1].07	[1].07	

ALBUQUERQUE, N. MEX.

Apr. 1	2.26				1.34		1.20	1.05	0.96	0.86	2.36
Apr. 2	2.26				1.35	1.52	1.35	1.18	1.03	.93	2.74
Apr. 3	2.49				1.35	1.55	1.29	1.09	0.97	.86	3.15
Apr. 4	2.62				1.24						3.45
Apr. 7	4.57			1.24	1.33	1.48	1.25	1.09		.86	2.62
Apr. 8	3.81				1.32						2.87
Apr. 11	3.81			1.14							2.87
Apr. 12	2.87			1.11	1.27		1.31	1.16	1.06	.99	2.74
Apr. 13	2.74				1.33						2.49
Apr. 14	3.99			1.04	1.25	1.49	1.28	1.11	.95	.85	3.00
Apr. 15	4.75			0.95	1.15	1.52					3.45
Apr. 17	5.56					1.32					4.37
Apr. 19	5.56							1.19			4.57
Apr. 22	3.63				1.28	1.44					3.81
Apr. 23	6.76				1.22	1.47	1.16	0.99	.88	.76	4.57
Apr. 25	2.87				1.26	1.49					4.17
Apr. 26	3.45				1.30	1.50	1.28	1.12			2.62
Apr. 28	4.37					1.52					4.75
Apr. 30	5.36					1.53	1.15	.97	.78	.69	5.36
Means				1.10	1.28	1.50	1.25	1.10	.95	.85	
Departures				−.02	−.01	.00	−.02	−.01	−.02	−.02	

LATE DATA

ALBUQUERQUE, N. MEX.

Mar. 12	4.75			1.19	1.35	1.58					3.15
Mar. 13	3.45			1.29	1.42						3.15
Mar. 16	1.70		1.27	1.43	1.48						2.06
Mar. 20	2.87			1.20	1.36	1.57	1.38	1.25	1.13	1.05	2.06
Mar. 21	2.74	0.99	1.10	1.19	1.27						2.16
Means		(.99)	(1.18)	1.26	1.38	(1.57)	(1.38)	(1.25)	(1.13)	(1.05)	
Departures		−.03	+.05	+.01	−.02	−.04	−.01	+.01	.00	+.02	

*Extrapolated.

[1] Smoke from forest fires.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct+diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington	Madison	Lincoln	East Lansing	New York	Fairbanks	Nashville	Twin Falls	La Jolla	New Orleans	Riverside	Blue Hill	Newport	State College	Put-in-Bay	Davis, Calif.
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	
Apr. 2	446	536	462	285	362	101	575	425	437	611	.....	389	420	217	303	398
Apr. 3	523	391	477	603	366	282	577	522	326	593	.....	276	327	541	599	597
Apr. 4	321	445	473	183	512	363	444	528	517	658	524	620	629	179	187	.....
Apr. 5	566	580	580	461	370	255	570	245	259	648	234	405	460	320	524	.....
Apr. 6	624	316	333	601	636	368	564	532	205	625	90	604	626	622	580	618
Apr. 7	285	487	580	183	480	374	438	547	260	556	167	626	627	330	94	445
Apr. 8	527	534	416	637	278	392	438	174	313	422	241	196	183	269	579	386
Mean	**473**	**470**	**474**	**422**	**429**	**305**	**515**	**425**	**331**	**588**	**251**	**445**	**467**	**354**	**409**	**529**
Departure	**+99**	**+99**	**+83**	.....	**+78**	**−25**	**+109**	**−9**	**−173**	**+173**	**−196**	**+53**	**+49**	**−28**	.....	.....
Apr. 9	479	207	266	491	606	377	242	81	563	465	398	499	574	536	448	664
Apr. 10	431	575	182	638	416	367	387	189	425	448	381	283	234	552	638	628
Apr. 11	641	341	117	570	615	411	443	391	612	506	556	512	610	616	627	616
Apr. 12	86	500	446	255	112	238	204	599	582	370	344	343	357	26	205	640
Apr. 13	284	257	609	350	507	275	256	599	614	.....	444	586	605	59	390	621
Apr. 14	479	410	593	430	326	403	368	608	500	650	428	456	664	404	400	566
Apr. 15	451	558	610	488	394	439	598	594	402	636	122	502	483	474	496	225
Mean	**407**	**407**	**403**	**460**	**425**	**386**	**357**	**437**	**528**	**534**	**382**	**454**	**504**	**381**	**458**	**566**
Departure	**+10**	**+3**	**−29**	.....	**+70**	**+20**	**−42**	**−21**	**+10**	**+100**	**−51**	**+92**	**+81**	**−18**	.....	.....
Apr. 16	519	378	592	411	240	354	351	588	228	209	167	477	501	67	458	408
Apr. 17	228	617	616	498	113	411	92	623	601	195	575	116	229	554	534	621
Apr. 18	260	241	632	550	560	424	50	501	176	443	577	651	653	202	544	476
Apr. 19	42	380	648	98	71	454	506	356	395	641	417	172	206	17	52	503
Apr. 20	416	608	615	113	312	239	72	341	320	629	414	107	222	367	212	485
Apr. 21	343	608	329	420	30	313	572	312	432	663	495	105	122	21	166	383
Apr. 22	346	507	336	639	183	304	108	646	277	639	580	278	209	559	660	666
Mean	**308**	**477**	**538**	**390**	**216**	**357**	**250**	**481**	**347**	**489**	**461**	**272**	**314**	**268**	**375**	**520**
Departure	**−106**	**+73**	**+91**	.....	**−172**	**−16**	**−158**	**−3**	**−201**	**+74**	**−43**	**−106**	**−99**	**−161**	.....	.....
Apr. 23	617	511	640	501	578	237	20	553	245	676	541	664	638	627	523	594
Apr. 24	538	540	565	593	506	454	422	408	531	735	577	594	619	418	595	610
Apr. 25	572	479	590	254	400	522	456	503	538	702	486	333	412	345	114	618
Apr. 26	608	509	230	656	635	368	586	560	640	705	579	659	681	661	692	502
Apr. 27	316	484	624	230	405	248	325	412	650	605	596	533	614	229	384	117
Apr. 28	570	632	557	.....	433	340	550	319	453	675	610	416	439	193	408	492
Apr. 29	664	135	565	.....	665	499	620	644	324	650	611	630	664	621	412	564
Mean	**555**	**456**	**538**	**447**	**518**	**387**	**426**	**470**	**483**	**678**	**572**	**547**	**581**	**442**	**447**	**500**
Departure	**+100**	**+14**	**+101**	.....	**+54**	**+19**	**−13**	**−35**	**−56**	**+261**	**+105**	**+86**	**+87**	**−54**	.....	.....
ACCUMULATED DEPARTURES ON APRIL 29, 1943																
	+1211	**+2919**	**+2625**	.....	**−826**	**−2695**	**−707**	**−367**	.....	.....	**−1904**	**−868**	**−539**	**−729**	.....	.....

531223—43——2

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR APRIL 1943

[Communicated by Capt. J. F. Hellweg, U. S. N. (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1943	h m		°	°	°	°				
Apr. 1	11 3	7569	−64	295	+3	65	485	2	G	U. S. Naval.
		7568	−1	358	−10	3	48	10		
		7568	+7	6	−10	7	97	5		
		7570	+40	39	+8	43	48	6		
				(359)	(−7)		678	23		
2	10 34	7569	−50	296	+3	52	485	1	G	Do.
		7568	+12	358	−9	12	97	8		
		7568	+21	7	−9	21	97	3		
		7570	+54	40	+8	56	12	3		
				(346)	(−6)		691	15		
3	10 57	7569	−37	296	+3	38	485	3	G	Do.
		7568	+27	0	−9	27	48	1		
		7568	+35	8	−9	35	97	3		
		7570	+67	40	+9	70	6	2		
				(333)	(−6)		636	9		
4	12 19	7569	−23	296	+3	25	533	12	F	Do.
		7568	+48	7	−9	48	97	1		
				(319)	(−6)		630	13		
5	10 41	7569	−9	298	+3	13	533	6	G	Do.
		7568	+61	8	−9	61	97	1		
				(307)	(−6)		630	7		
6	10 53	7569	+4	297	+3	11	533	12	G	Do.
		7568	+72	5	−9	72	24	1		
				(293)	(−6)		557	13		
7	12 16	7569	+18	297	+3	22	485	5	G	Mt. Wilson.
				(279)	(−6)		485	5		
8	10 41	7569	+31	298	+3	33	485	4	VG	U. S. Naval.
				(267)	(−6)		485	4		
9	10 44	7571	−74	180	−10	74	242	8	G	Do.
		7569	+44	298	+3	46	485	3		
				(254)	(−6)		727	11		
10	10 33	7571	−61	180	−11	61	339	12	F	Do.
		7569	+57	298	+3	59	436	3		
				(241)	(−6)		775	15		
11	10 33	7571	−48	180	−11	48	388	17	F	Do.
		7569	+70	298	+3	72	339	2		
				(228)	(−6)		727	19		
12	11 59	7571	−33	181	−11	33	533	26	VG	Mt. Wilson.
		7569	+87	301	+3	88	339	1		
				(214)	(−6)		872	27		
13	10 37	7571	−20	181	−11	21	485	11	F	U. S. Naval.
				(201)	(−6)		485	11		
14	10 37	7571	−9	179	−11	11	97	12	G	Do.
		7571	−3	185	−11	6	388	5		
				(188)	(−6)		485	17		
15	11 57	7572	−73	101	+10	75	97	1	G	Do.
		7571	+4	178	−12	8	48	7		
		7571	+11	185	−11	12	339	4		
				(174)	(−6)		484	12		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR APRIL 1943—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1943	h m		°	°	°	°				
Apr. 16	11 21	7573	−61	100	+12	64	48	5	G	U. S. Naval.
		7572	−60	101	+9	62	97	1		
		7571	+16	177	−12	17	24	3		
		7571	+25	186	−11	25	291	3		
				(161)	(−6)		460	12		
17	13 13	7573	−47	100	+12	50	388	17	G	Do.
		7572	−46	101	+9	49	97	1		
		7571	+30	177	−13	30	12	1		
		7571	+39	186	−10	39	291	9		
				(147)	(−5)		788	28		
18	13 17	7573	−37	97	+12	41	242	13	VG	Do.
		7572	−33	101	+9	36	97	1		
		7573	−32	102	+11	36	291	10		
		7571	+52	186	−11	53	242	5		
				(134)	(−5)		872	29		
19	12 1	7573	−25	96	+11	30	388	20	VG	Mt. Wilson.
		7572	−20	101	+9	24	73	1		
		7573	−19	102	+11	25	291	12		
		7571	+66	187	−12	66	194	6		
				(121)	(−5)		946	39		
20	11 9	7573	−11	97	+12	19	339	15	G	U. S. Naval.
		7573	−7	101	+11	17	145	10		
		7572	−7	101	+9	16	73	1		
		7573	−3	105	+10	15	291	1		
				(108)	(−5)		848	27		
21	10 50	7573	+5	100	+10	16	1,067	44	VG	Do.
		7572	+7	102	+7	15	73	1		
				(95)	(−5)		1,140	45		
22	12 39	7573	+17	98	+11	24	485	34	VG	Do.
		7572	+21	102	+9	26	48	1		
		7573	+25	106	+10	30	630	14		
				(81)	(−5)		1,163	49		
23	11 6	7573	+30	99	+11	34	485	27	VG	Do.
		7572	+35	104	+8	37	48	2		
		7573	+38	107	+10	41	727	7		
				(69)	(−5)		1,260	36		
24	10 34	7573	+42	98	+11	46	436	20	F	Do.
		7572	+49	105	+8	51	36	1		
		7573	+50	106	+10	52	836	6		
				(56)	(−5)		1,308	27		
25	12 5	7573	+56	98	+10	58	388	16	F	Do.
		7572	+63	105	+8	65	24	1		
		7573	+64	106	+9	66	1,139	10		
				(42)	(−5)		1,551	27		
26	11 0	7573	+68	97	+11	70	242	7	G	Do.
		7572	+76	105	+8	78	18	1		
		7573	+77	106	+10	78	1,212	5		
				(29)	(−5)		1,472	13		
27	11 6	7574	−78	298	+2	78	242	1	G	Do.
		7573	+84	100	+11	84	194	2		
				(16)	(−5)		436	3		
28	10 37	7574	−64	299	+2	64	194	1	G	Do.
				(3)	(−4)		194	1		
29	9 10	7574	−49	302	+1	49	194	1	VG	Mt. Wilson.
		7575	+1	352	−1	3	12	1		
				(351)	(−4)		206	2		
30	10 5	7574	−37	300	+1	38	194	1	G	Do.
				(337)	(−4)		194	1		

Mean daily area for 30 days = 740

(*) Not numbered.

VG = very good; G = good; F = fair; P = poor.

Chart I.—Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, April 1943

Chart I. · Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, April 1943

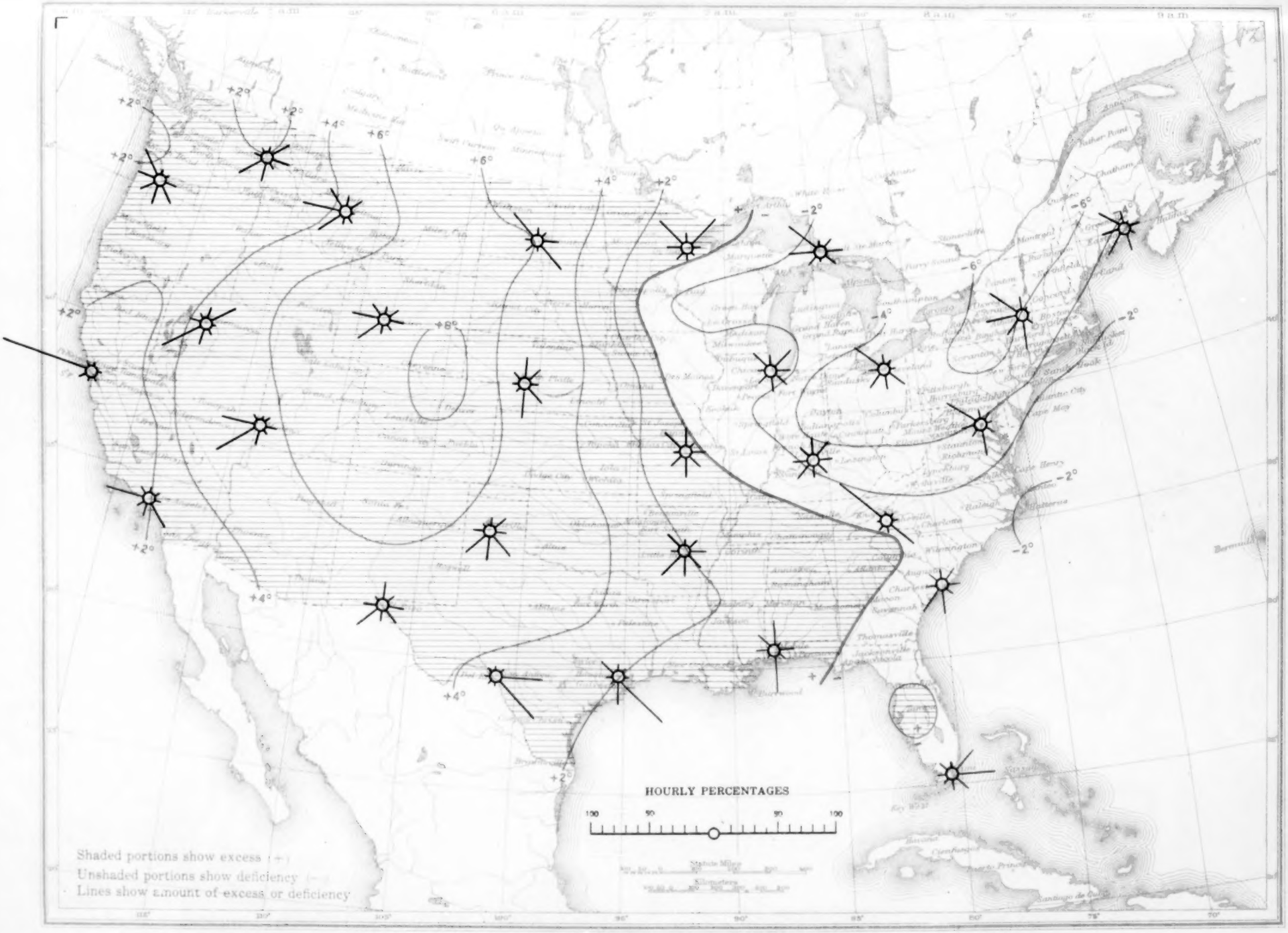
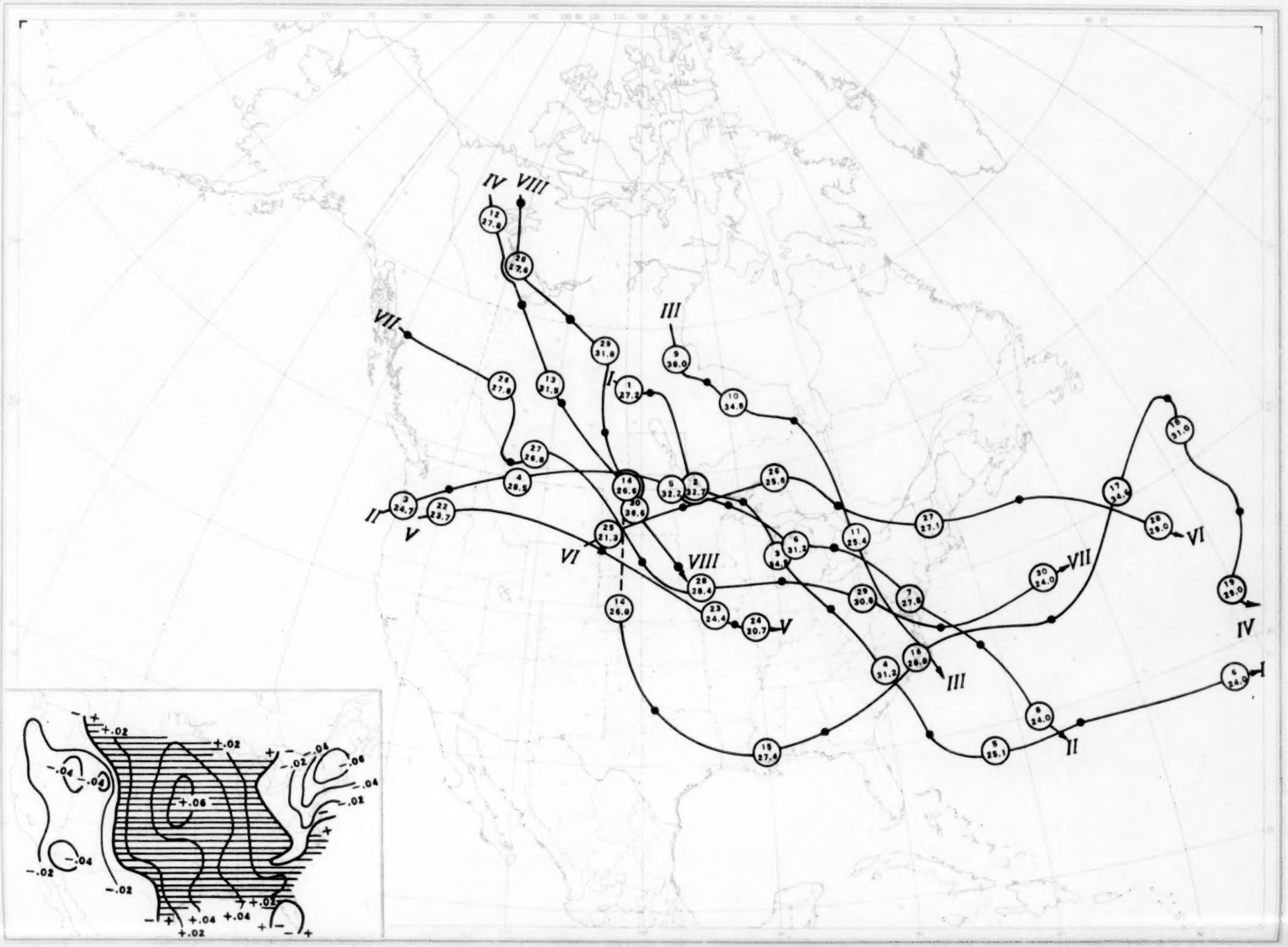


Chart II. Tracks of Centers of Anticyclones, April 1943. (Inset) Departure of Monthly Mean Pressure from Normal

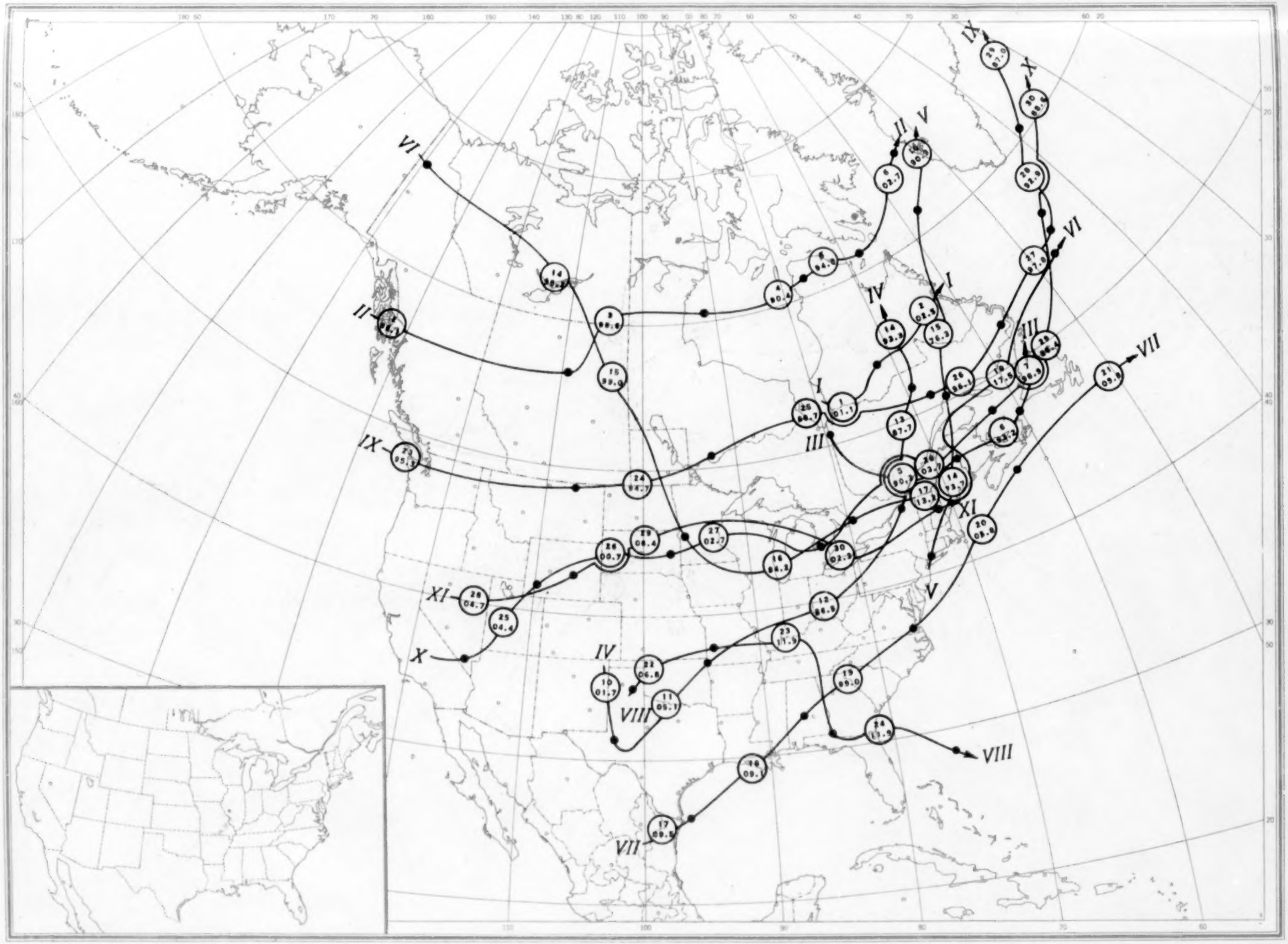


Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time)

Chart III. Tracks of Centers of Cyclones, April 1943.

Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time).

Chart III. Tracks of Centers of Cyclones, April 1943.



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, April 1943

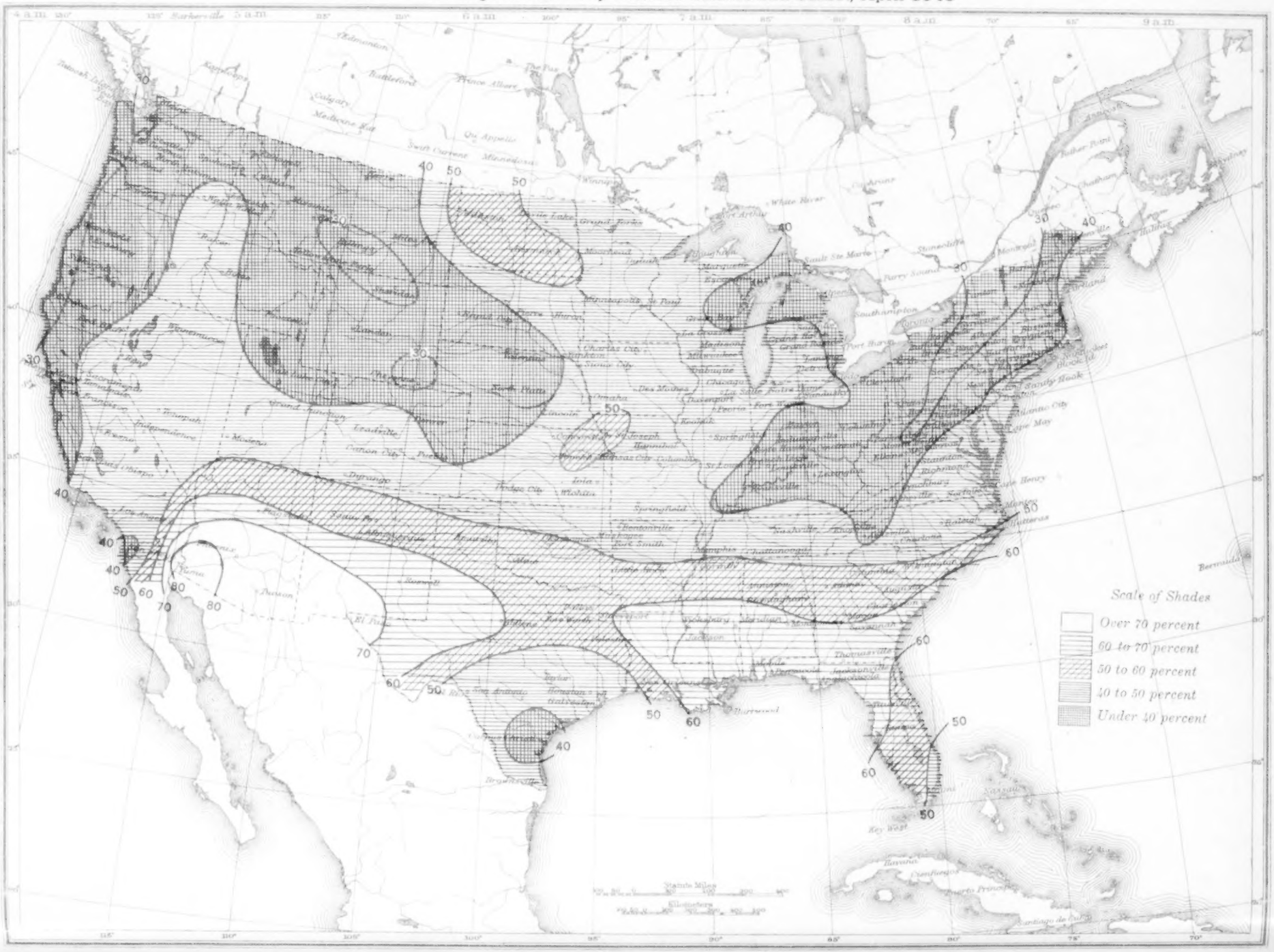


Chart V. Total Precipitation, Inches, April 1943. (Inset) Departure of Precipitation from Normal

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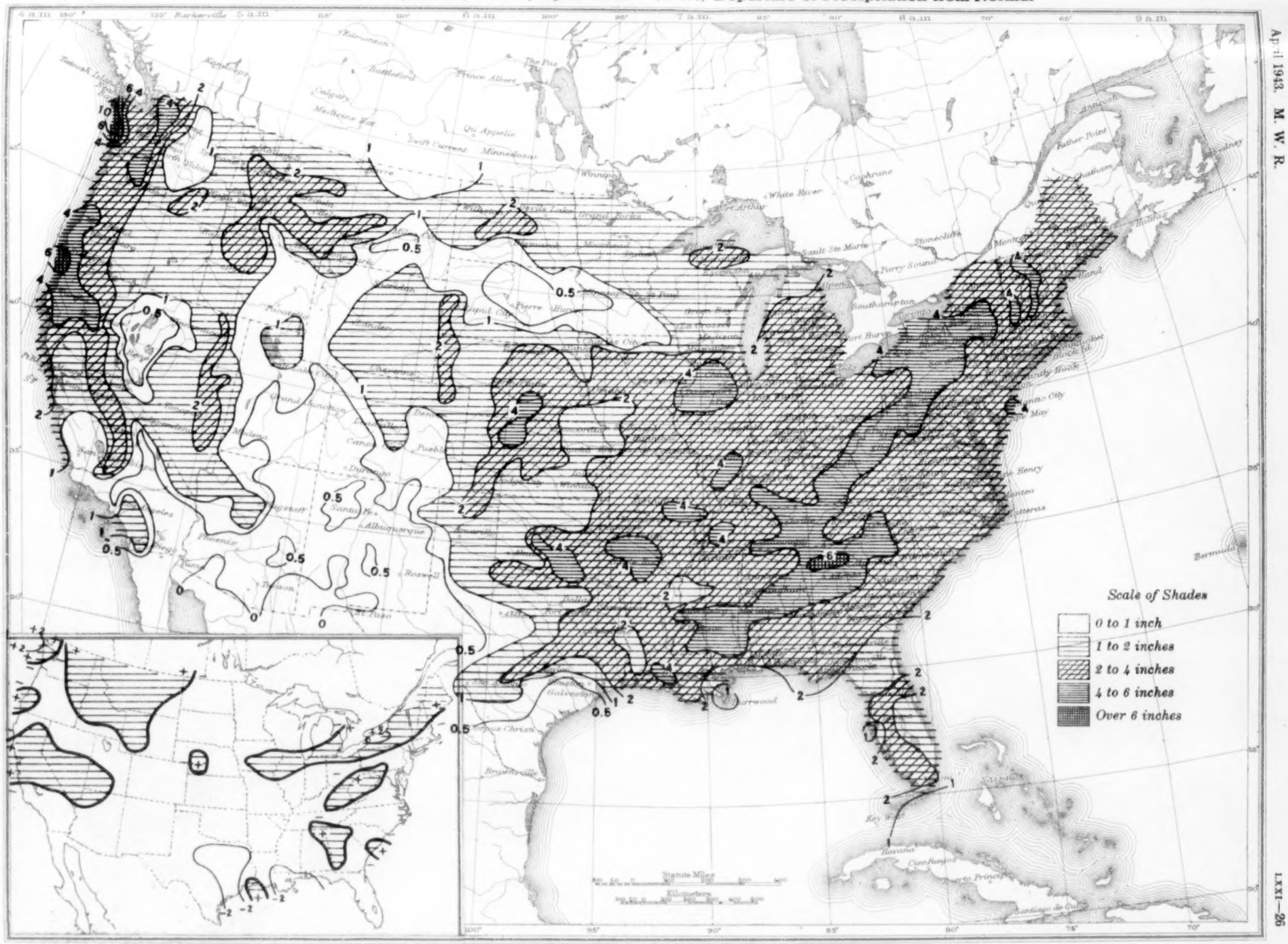
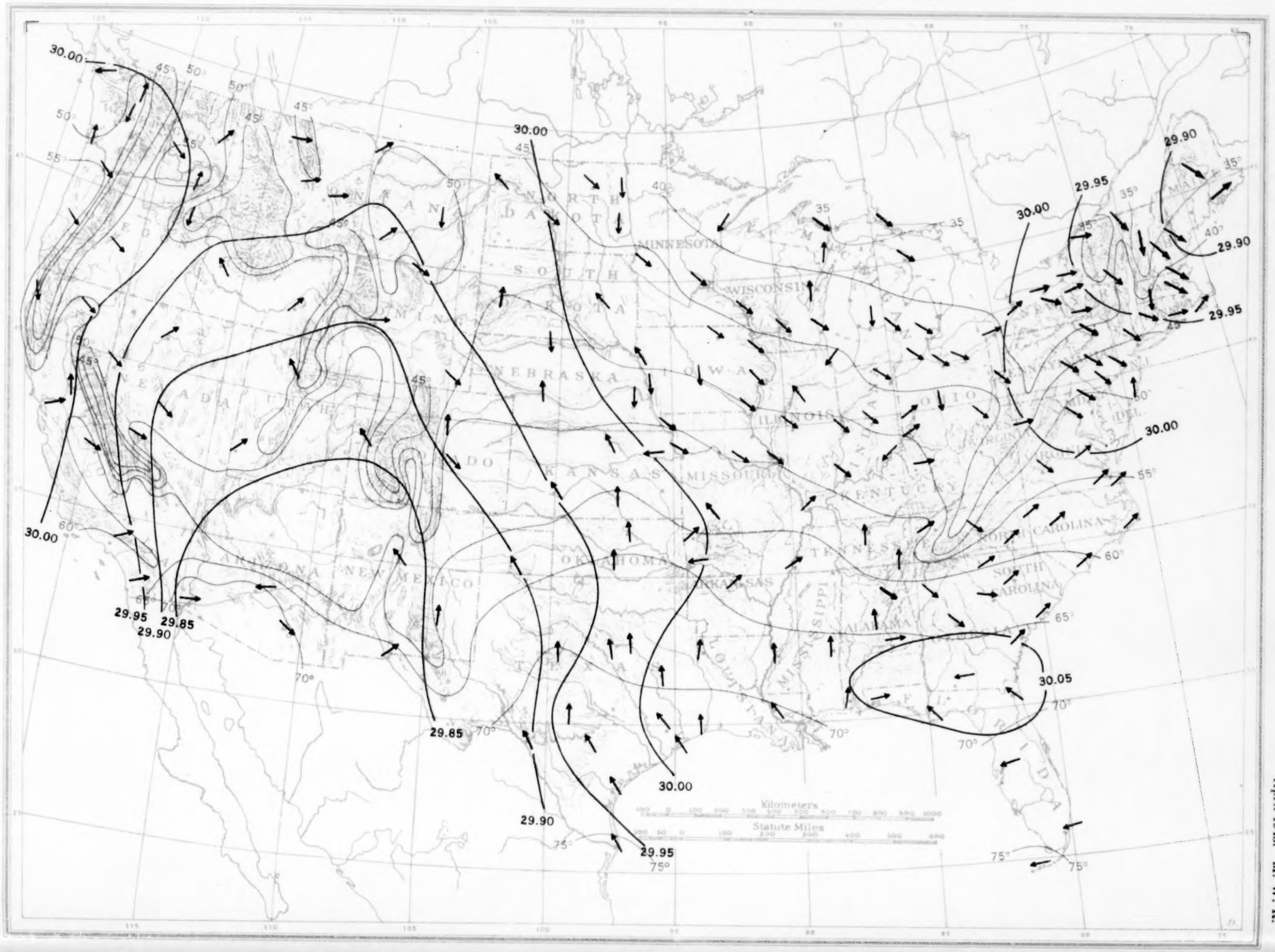
Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, April 1943